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MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

SHUTE, P. G. & MARYON, M. E. **Laboratory Technique for the Study of Malaria.**

This book was reviewed on p. 970.

CARAYON, A., BLANC, J. F. & CARON, J. J. 21 accidents nerveux par injection intra-fessière d'anti-paludiques. Indications de la neurolyse des troncs plexuels sciatiques. [**Nervous Complications from Intragluteal Injections of Antimalarials. Evidence of Neurolysis of Sciatic Plexal Trunks**] *Bull. Soc. Méd. Afrique Noire Langue Française*. Dakar. 1960, v. 5, No. 2, 116–32. [33 refs.]

BUSVINE, J. R. **Use of Pyrethrum Spraying for Malaria Control.** *Bull. World Health Organization*. Geneva. 1960, v. 22, No. 5, 593–5. [Refs. in footnotes.]

A summary is given of reports regarding pyrethrum spraying as an anti-malarial measure by various workers in South Africa, India and West Africa, published during the period 1936 to 1947. In Zululand this measure was used successfully to deal with epidemic malaria. In various parts of India a substantial reduction of malaria incidence was effected. In West Africa pyrethrum spraying seems to have been less successful and in one experiment in Nigeria it failed completely.

The main objection to the use of pyrethrum sprays for malaria control is the necessity for frequent application, at least twice weekly. The author considers, however, that they may possibly be found useful (a) where insect vectors display resistance to both types of chlorinated residual insecticide; (b) mixed with residual sprays to destroy resistant bed bugs and house-flies (for a short time), which would promote public relations in antimalaria campaigns; and (c) to suppress emergence of resistant strains of mosquito. *G. Covell*

De Mello, V. H. Erradicação da malária (nova estratégia na luta anti-malárica). **[Eradication of Malaria]** *Arquivos de Hig. e Saúde Pública.* S. Paulo. 1960, Mar., v. 25, No. 83, 7–18, 1 chart & 2 maps. [18 refs.]

The English summary appended to the paper is as follows: —

"The advent of insecticides with residual action against anopheline mosquitoes has produced remarkable results, but, some troubles appeared because, when the control of the malaria endemicity was reached the sanitary authorities had to face two problems: the progressive reduction of financial resources and the anopheline resistance to insecticides. This situation has taken WHO to carry out the eradication of malaria as a new strategy.

"The Eradication Campaign of Malaria is conducted with the same technics used in control programs, the difference being more administrative and social than technical. The eradication fundamental principles are based upon the natural exhaustion of the infection sources which is reached with the ceasing of the parasitic transmission.

"The malaria incidence was reduced in about 80% (eighty per cent) after 12 years of DDT control, in the State of Sao Paulo, Brazil. However, the transmission of malaria still occurs in 194 'municípios' (counties) covering an area of 110,318 Km^2, with a population of 2,703,536 inhabitants and 620,744 dwellings.

"The Malaria Eradication Campaign the preparatory phase of which took place in 1959, has begun the whole insecticide coverage of malarious area in February 1960. This area was divided in eight Zones with 103 brigades for spraying DDT. The campaign is accomplished by the Government of the State through covenants with National Government, Pan American Sanitary Bureau (PASB), WHO, and International Cooperation Administration (ICA). Along with the malaria eradication the prophylaxis of Chagas' Disease will be performed; this endemic covers a larger area than that of malaria."

Steyn, J. J., Brink, C. J. H., Botha, H. P., Pretorius, H. M. & Combrink, H. J. **Possible Simplified Gravidity Technique for detecting Physiological Resistance of** *Anopheles gambiae* **to BHC.** *South African Med. J.* 1959, Feb. 28, v. 33, No. 9, 172.

Accepting that all *Anopheles gambiae* remain at rest in huts, holes and other refuges ["dongas"] until fully gravid, the authors suggest that occurrence of mosquitoes in this state on surfaces treated with BHC is an index of physiological resistance. Results from the Lowveld of the Transvaal are given indicating that, on this criterion, there is no physiological resistance in the mosquito there. The method was conceived as being complementary to more orthodox tests, when few adults can be collected. [It would seem that such a "late" criterion might, in fact, allow a dangerous level of resistance to develop undetected.] No behaviouristic resistance is induced, since good numbers of males, unfed females and some half-gravid females could be collected on treated surfaces. [Could half-gravids not be interpreted as evidence of incipient physiological resistance building up in the population?]

D. S. Bertram

SUZUKI, T. **A Method for Estimating the Effect of Insecticides in a Field Test.** *Japanese J. Exper. Med.* 1960, Feb., v. 30, No. 1, 67–74, 4 figs.

"A new method was introduced for the assessment of the effect of insecticide application in the field. The method is based on the correction of the population values represented by the number of insects, *i.e.*, flies, mosquitoes, cockroaches, in the test section after the application of an insecticide by those in the test sections before the application, and in the check section before and after the day of the chemical application.

"The 'relative population index', or RPI, is represented by the following formula:

$$E_i = Tb \times \frac{Ca_i}{Cb}$$

$$RPI = \frac{Ta_i}{E_i} \times 100 = \frac{Cb \times Ta_i}{Ca_i \times Tb} \times 100$$

"Cb = Average population value in the check section before the day of the application.

"Ca_i = Population value in the check section i days after the day of the application.

"Tb = Average population value in the test section before the application.

"Ta_i = Population value in the test section i days after the day of the application.

"E_i = Expected population value, or the population value i days after the application which is expected if no insecticide had been applied.

"By demonstrating the fluctuation of the RPIs on a graph paper in logarithmic scale, the effect of insecticide application to the population of the insects is able to be evaluated distinctly.

"Several examples applying the 'RPI method' to the data in field tests on cockroach and fly control were demonstrated, and the factors on which the method is based were discussed."

DRAPER, K. C. & DRAPER, C. C. **Observations on the Growth of African Infants with special reference to the Effect of Malaria Control.** *J. Trop. Med. & Hyg.* 1960, July, v. 63, No. 7, 165–71, 5 figs. [22 refs.]

As part of a study of the effects of controlling malaria in East Africa, observations were made on the growth of infants over a 4-year period before and after the reduction of malaria transmission by the use of residual insecticides. Birth weights could not be obtained, and few babies were brought before the age of 6 weeks. They were followed up to the age of 18 months. As one result, tables give mean attained weights and mean monthly weight increments for significantly large groups of children of accurately known age, thus adding to the number of studies of this nature in Africa. The story told by the figures is by now becoming familiar. Up to 6 months the African child's growth is much the same as that of the European or North American child, but thereafter the African child of either sex falls behind the European counterpart and never catches up again. Graphs of the rate of growth show that it is not an even, continuous process throughout the year. Reduced rate of growth during the hot

season is probably explained by the greater incidence of infectious disease in this period; also, perhaps, partial anorexia by the infant and less effective lactation by the mother.

The malaria parasite rate among infants was high at all ages above 3 months in 1955, but by 1957 only 9 positive findings were recorded in the year. Haemoglobin levels improved by almost 2 gm.% and the infant mortality rate declined from over 200 to about 100, but no specific effect on growth rates was noted. Infections other than malaria can have important effects on growth. In infants who actually lost weight during a month, diarrhoea was the most frequently associated illness (73% in 1957 and 53% in 1958), followed by upper respiratory infections and "fever". The persistence of these multitudinous causes of setbacks may have masked the beneficial effects of malaria control..

B. B. Waddy

GARNHAM, P. C. C. **A New Sub-Species of** *Plasmodium cynomolgi*. *Riv. di Parassit.* Rome. 1959, Dec., v. 20, No. 4, 273–8, 5 coloured figs. on pl.

The tertian malaria parasite of macaque monkeys, *Plasmodium cynomolgi*, is represented by 2 forms: (1) the type, *P. c. cynomolgi*, and (2) a Formosan strain, *P. c. cyclopsis*. In the present paper the author describes a third form, originating from Malaya, for which the name *P. c. bastianellii* subsp. nov. is proposed.

The new subspecies differs from the typical one in the following characters: its incubation (prepatent) period is a day shorter (7 days); its schizogonic cycle in the blood lasts 48 hours, but it is completed about 12 hours later than in the type; the blood infection reaches a crisis after 7–9 days. More important differences are observed in the pre-erythrocytic cycle, which lasts 7 (instead of 8) days. The schizonts in the liver are smaller than those of the type strain and contain only small vacuoles; their nuclei are characterized by the earlier appearance of deoxyribonucleic acid.

Experimental evidence was produced of the absence of cross-immunity between the type-subspecies and the new one, *viz.* monkeys which had recovered from infection with the former were susceptible to infection with the new parasite. As regards sporogony, its duration was a day shorter (8, instead of 9), than in the type form.

Pre-erythrocytic schizogony is depicted in an excellent coloured plate.

C. A. Hoare

EYLES, D. E., COATNEY, G. R. & GETZ, M. E. **Vivax-Type Malaria Parasite of Macaques transmissible to Man.** *Science*. 1960, June 17, v. 131, 1812–13.

During the course of large-scale experiments involving the use of the sporozoites of *Plasmodium cynomolgi bastianellii* [see above], 2 members of the staff developed a fever with a tertian periodicity; blood films were examined and *vivax*-like parasites were seen. It was quickly realized that the infection originated from monkeys and not from any indigenous human malaria, and

this view was confirmed by subinoculation of blood from both patients into rhesus monkeys, which developed normal *bastianellii* infections. Experimental infections were then induced in 2 volunteers by the bite of infected mosquitoes (*Anopheles freeborni*) and in 2 others by the inoculation of infected blood. All the infections in man were accompanied by marked symptoms with a low or subpatent level of parasitaemia; they were easily terminated by chloroquine. A further accidental human case was observed by Leon SCHMIDT (director of the Christ Hospital Institute for Medical Research, Cincinnati), who maintains the strain in his own laboratory.

Cross-immunity tests showed that the human infections were in fact due to *bastianellii*, which the authors had previously found to correspond in morphology, etc., with the characters described [by the abstracter] in the original paper.

The authors suggest that this discovery may have important epidemiological implications, and that research into the possible role of monkeys as reservoirs of human infection is required, particularly in view of the current malaria eradication programme. *P. C. C. Garnham*

BAMI, H. L. **Metabolic Studies with 1-p-Bromophenyl-2 : 4-Diamino-1 : 6-Dihydro-6 : 6-Dimethyl-1 : 3 : 5-Triazine (M.I.S. 11) in Monkeys.** *Indian J. Malariology*. 1959, Dec., v. 13, No. 4, 145–52, 3 graphs. [20 refs.]

AL-DABAGH, M. A. **The Effects of Splenectomy on *Plasmodium juxtanucleare* Infections in Chicks.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1960, July, v. 54, No. 4, 400–405. [14 refs.]

Rhode Island Red chicks were inoculated with *Plasmodium juxtanucleare* and the course of the disease was observed in relation to splenectomy which was performed (under nembutal and ether anaesthesia, after 12 hours' starvation) either 30–71 days after or 1–8 days before infection. "Mock" splenectomies (laparotomy without removal of the spleen) were done on a group of chicks as controls, in order to observe the effect of an operation alone.

All the chicks splenectomized after infection showed recrudescences with parasitaemias much above the average, and over half died of the disease. Marked haemopoiesis in the organs was observed accompanied by gross infiltration and increased phagocytic activity, while the well known lesions in the heart and brain were particularly severe. Exo-erythrocytic parasites were seen in the brain of 2 chicks, and gametocyte production was found to be enhanced in the blood.

The chicks splenectomized before infection responded quite differently and the course of the disease appeared to be the same as in intact birds, or in the controls which had undergone "mock" splenectomy.

The author concludes that the spleen is of importance (much greater than its mere content of phagocytic cells would indicate—which is but a small fraction of those occurring elsewhere in the body) in acquired immunity, but is not of importance as far as the initial reaction is concerned. This phenomenon has been noted in other species of avian malaria also [this *Bulletin*, 1949, v. 46, 1122].

P. C. C. Garnham

LAIRD, M. **Malayan Protozoa 3. Saurian Malaria Parasites.** *J. Protozoology.* Utica. 1960, Aug., v. 7, No. 3, 245–50, 15 figs. [17 refs.]

"*Plasmodium minasense* Carini and Rudolph is recorded from three of 28 examples of *Gonyocephalus borneenis* (Schlegel) from Kepong and Bukit Lagong, Selangor, and *P. vastator* n. sp. is described from a single example of *Draco volans* Gray from Ulu Langat, Selangor. Both of these arboreal agamid lizards are new hosts for malaria parasites. *P. vastator* n. sp. is characterized by its highly amoeboid trophozoites, nucleophilic schizonts producing from four to eight (usually six) merozoites, and large (up to 22.1 × 8.1 μ) gametocytes which alter and ultimately destroy the host cell. Forty-six other lizards of nine species, and 28 snakes of 11 species, proved negative for *Plasmodium*."

TRYPANOSOMIASIS

*In this section abstracts are arranged as far as possible in the following order:—*African*—human, animal;* American*—Chagas's disease and other trypanosome infections. In each form the following order is followed:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

WEST AFRICAN INSTITUTE FOR TRYPANOSOMIASIS RESEARCH. **Annual Report 1959** [WILLETT, K. C., Director]. pp. iii + 54, 1 fig. 1960. London: Crown Agents for Oversea Governments & Administrations, 4, Millbank, S.W.1.

The report is accompanied on this occasion by a 7-page pamphlet which contains a condensed account of the year's work and will be valuable for rapid reference by busy people. Protozoological research continued into the study of factors influencing infection of *Glossina palpalis* with *Trypanosoma gambiense*. It was found that higher infection rates could be obtained by giving the infected feed on the first day of life and this was facilitated by incubating the pupae at higher temperatures. Studies of trypanosome morphology seemed to confirm that the short, stumpy forms infected the fly, and indicated that posterior nuclear forms result from the nucleus moving backwards in response to unidentified factors. The analysis of trypanosome extracts by chromatography and electrophoresis, previously reported, was continued. Further studies of *T. dimorphon* (?) tended to confirm that it is distinct from strains of *T. congolense* both morphologically and biologically, but it is still not clear whether they are different species or opposite extremes of a range of strains of one species. The immunological relationship between members of the *T. brucei* group was studied with the use of sheep antisera and it was found that monomorphic syringe-passaged strains gave a group reaction while polymorphic strains reacted strongly only with homologous serum. Precipitating antibodies in the sera of infected animals have been demonstrated by Ouchterlony's agar gel technique.

Attempts are being made to reduce the severity of local reactions to suramin complexes when injected and to improve their prophylactic activity. Biochemical studies were made of the composition of protein in trypanosome extracts in normal and drug-resistant strains, and trypanosome homogenates were investigated by centrifugal fractionation. Entomological studies confirmed the high abortion rate in forest *Glossina* but indicated no cause. Their blood meals were identified and some general observations were made on the ecology of tsetse in the Cameroons. The identification of the nocturnal resting places of the flies has led to a more economical spraying technique. Alterations in methods of handling and feeding *G. morsitans submorsitans* have improved the rearing of this species in the laboratory.

This is a fine record of research and the Director and staff can congratulate themselves on a satisfactory year's work. [For the 1958 Report, see this *Bulletin*, 1959, v. 56, 1011.] *T. H. Davey*

SHORE, H. **An Epidemic of Sleeping Sickness in the Lango District of Uganda. Part I.** *East African Med. J.* 1960, Jan., v. 37, No. 1, 9–21, 1 map & 1 graph. **Part II.** Feb., v. 37, No. 2, 75–88, maps 2–3. **Part III.** Apr., v. 37, No. 4, 255–78, maps 4–6 & graphs 2–3. [30 refs.]

Uganda has the misfortune to be the meeting place of *Trypanosoma gambiense* and *T. rhodesiense*. The paper under review gives a very detailed account of sleeping sickness of both varieties in the Lango district of northern Uganda, interesting and illustrated with maps. For this abstract it is necessary to pick out only the points which are of topical interest to the outsider.

There have been 3 major epidemics of sleeping sickness in Uganda's history. The notorious and devastating Lake Victoria epidemic discovered in 1901 and the West Nile epidemic of 1928 to 1946 were both caused by *T. gambiense*, but in the Busoga epidemic of 1940 to 1943 *T. rhodesiense* was the cause. As might be expected, the *T. rhodesiense* epidemic ran a more explosive course than the others. Lango district is in the centre of northern Uganda. *T. gambiense* sleeping sickness has been endemic in districts bordering on it to the north, west and south ever since the Lake Victoria epidemic, and was first found in Lango in 1945. Clearing and DDT spraying along the Moroto river, which runs through savannah country with riverine forest and many swamps, were started in 1946, and the scale of operations was increased in 1950. Nevertheless, a suspicious rise of sleeping sickness incidence was found by limited surveys in 1955. Mass surveys of a population of 51,614 revealed 149 cases, 106 of them within an area of 10 square miles, and the unusual proportion of 61% occurring in women and children.

Though some waterholes were in use, the majority of people drew water from the main river or its tributaries, and also bathed and fished. *G. palpalis* control was attempted by spraying the banks of the main river and some tributaries with 5% dieldrin from a dinghy or on foot. Difficulty of access and of movement along the river beds limited progress to about 3·5 miles daily. There was heavy mortality among fish, which gave rise to local resentment, but fish returned within a few weeks. In the light of resurveys more tributaries were treated and since then a policy of barrier spraying, namely two-monthly treatment of the important rivers at the periphery of the sprayed area, has been

carried out. Spraying in other parts is carried out whenever fly density reaches a level of 1 old fly per mile. The degree of sleeping sickness control achieved was not very high, for resurveys in 1957 and 1958 revealed 86 and 70 new cases respectively.

Only 3 deaths occurred between December 1956 and September 1957. One suggested an allergic reaction following the (4th) suramin injection, 1 patient collapsed and died at home during the period of treatment; the third died of the effects of an injection abscess. Most of the cases were diagnosed by positive gland juice. Somewhat fewer had positive blood films, and experimental blood culture on blood agar slopes was positive in 24 out of 30 cases diagnosed by routine methods. Suramin and tryparsamide were used for treatment in the field. Mel B was given only to hospital patients with abnormal cell and protein findings in the cerebrospinal fluid.

Besides the main outbreak described above, sleeping sickness suggestive of the *T. rhodesiense* type, probably carried by *G. pallidipes*, was found in 1953 in the south-west of Lango. [A map shows the location.] This was traced to two immigrant labourers from Tanganyika. 2 more cases were found in 1954, but no further cases since then. The tsetse (*morsitans-pallidipes*) belt concerned had become already a serious threat to cattle. Reclamation operations, consisting of aerial DDT spraying and extermination of big game, have been undertaken.

B. B. Waddy

PIZZI, T. & TALIAFERRO, W. H. **A Comparative Study of Protein and Nucleic Acid Synthesis in Different Species of Trypanosomes.** *J. Infect. Dis.* 1960, July, v. 107, No. 1, 100–107. [24 refs.]

GRANT, P. T. & SARGENT, J. R. **The L-α-Glycerophosphate Dehydrogenase Component of an Oxidase System present in** *Trypanosoma rhodesiense*. *Biochem. J.* 1960, Sept., v. 76, No. 3. Proc. Biochem. Soc. 48P–49P.

GRANT, P. T. & SARGENT, J. R. **Properties of L-α-Glycerophosphate Oxidase and its Role in the Respiration of** *Trypanosoma rhodesiense*. *Biochem. J.* 1960, Aug., v. 76, No. 2, 229–37, 7 figs. [41 refs.]

Attention has frequently been drawn to the absence of cytochromes in certain pathogenic African trypanosomes [this *Bulletin*, 1959, v. 56, 1113] including *Trypanosoma rhodesiense*. This difference in biochemical properties of trypanosomes and human tissues has potential interest for chemotherapy. The present investigation deals with the respiratory mechanisms of the blood stream form of *T. rhodesiense* and mainly with the properties of L-α-glycerophosphate oxidase which plays a part in the breakdown of certain substrates in the EMP system. Its reaction with oxygen appears to be unassociated with the presence of pyridine nucleotides, since neither DPN nor TPN enhances oxidase activity, or with a cytochrome system. Cell-free preparations of the parasite were obtained by a combination of methods including ultrasonic treatment. The oxygen uptake of intact parasites and that of cell-free parasites was compared. It was found that the latter had only a limited ability to oxidize glucose and

intermediates of the tricarboxylic acid cycle and substrate amounts of DPNH and TPNH, whereas L-α-glycerophosphate was rapidly oxidized. The reaction with L-α-glycerophosphate was markedly affected by mapharside, hydrogen peroxide and *p*-chloromercuribenzoate, but surprisingly iodoacetate, which acts on intact trypanosomes was without effect and likewise agents which affect the cytochrome system. It appeared from the results that the above particulate oxidase system plays the chief part in the oxidative metabolism of *T. rhodesiense*.

[The statement by the authors that "There is no evidence that trypanosomes contain mitochondria (ANDERSON, SAXE and BEAMS, 1956)" would not meet with wide acceptance.] *J. D. Fulton*

WELCH, J. R. **Variations in the Venation of *Glossina morsitans orientalis* Vanderplank (Diptera: Muscidae).** *Proc. Roy. Entom. Soc. of London.* Ser. A. 1960, July 15, v. 35, Pts. 4/6, 58–60, 1 fig.

BURSELL, E. **Free Amino-Acids of the Tsetse Fly (*Glossina*).** [Correspondence.] *Nature.* 1960, Aug. 27, v. 187, 778, 1 fig.

Chromatographic analysis of well-fed and starved *Glossina morsitans*, with the use of only head and thorax to avoid contamination with digestion products in the gut, show that alanine, glutamine and aspartic acid constitute a reserve food in starving flies, nutritional substances being obtained by their de-amination, the products of which are all members of the citric acid cycle. This is probably the nature of the non-fatty substance known, from other experiments, to decrease in starving flies. Less striking changes were found for *Musca, Lucilia* and *Apis* but other blood-sucking insects are at present being investigated for report elsewhere. *D. S. Bertram*

KIRKBY, W. W.; BLASDALE, P.; DAVIES, H. **The Eradication of *Glossina morsitans submorsitans* Newst. and *Glossina tachinoides* Westw. in Part of a River Flood Plain in Northern Nigeria by Chemical Means. Part II** [KIRKBY & BLASDALE]. **(With an Appendix on Persistence of DDT under Field Conditions.)** *Bull. Entom. Res.* 1960, July, v. 51, Pt. 2, 253–64, 4 figs. **Part III** [DAVIES & BLASDALE]. *Ibid.*, 265–70, 2 figs.

During the dry seasons of 1956, 1957 and 1958, the Veterinary Tsetse Control Unit of Northern Nigeria extended its campaign against *Glossina morsitans* and *G. tachinoides* down the Komadugu Gana river, which supports a narrow isolated fly belt, running through the Sudan savannah vegetation zone to the arid northern limit of these species' range. The basic method employed has been to spray selectively only the dry season fly concentration sites, with a single application of either 5 or 3·75% DDT (50% wettable powder in aqueous suspension). The work for each of the 3 years has been described in separate papers, forming Parts I, II and III of the series. Part I described the original pilot scheme [see this *Bulletin*, 1958, v. 55, 873], leaving Parts II and III to be dealt with below.

The campaign for 1957 (Part II) was planned to deal with a section of the river plain some 20 miles long by 4 miles wide; to the south this area was already isolated by a natural barrier, but to the north a mile-wide ruthless clearing was made which extended for 6 miles from edge to edge of the flood plain. To facilitate spraying, footpaths were first cut through the thickets and denser clumps, and efforts made to reduce the leaf canopy by encouraging fierce grass fires. As in 1956, a 5% concentration of DDT was applied by knapsack sprayers. The waterside *Mimosa* was sprayed only along the edges of cut paths, but elsewhere treatment was confined to the first 5 feet of tree trunks of a diameter of over 6 inches growing in shaded and sheltered situations, and to holes and crevices, fallen trees, and overhanging roots in the river banks; no creepers, twigs or leaves received any intentional deposit, nor vegetation growing in exposed situations. The fly population decreased towards extinction, but unfortunately the spraying gangs were unable to reach the northern barrier before the rains broke so that contiguous treated and untreated areas had to be left during the ensuing wet season. The ruthless barrier clearing cost about £1,000 per square mile, as against only £98 per square mile for eradication of the fly in 55 square miles of country, 48 square miles of which " remained free of fly by the following dry season ". (The authors of Part III state that during the rains of 1957 a few scattered flies of both species survived in the sprayed areas but that they died out in the following dry season; hence eradication was achieved.) In an appendix, tests on the persistence of DDT under dry-season field conditions are described; it was concluded that the limit of useful persistence is still unknown, but that on bark it is at least 52 days, as indicated by a 10-second exposure test with *G. morsitans*.

Part III deals with the 1958 campaign. A preliminary survey indicated that the wet-season invasion by tsetse from the untreated section into the area sprayed in 1957 had only penetrated to a depth of about 2 miles, suggesting that, when the front is very narrow, it is far cheaper to re-spray the ground lost to the fly than to make an expensive barrier clearing to prevent invasion. In the latter part of the season, it was found that a weaker suspension of only 3·75% DDT sufficed to achieve eradication. A further 69 square miles of dry season habitat were selectively sprayed, at a cost of approximately £86 per square mile including insecticide and labour; 18 months later the area was still fly-free. Since the area of normal wet-season fly infestation was far greater than the area treated, the cost per square mile of grazing reclaimed is much lower than the figure quoted. *T. A. M. Nash*

CANTRELL, W. **The Pattern of Antigenic Variation in** *Trypanosoma equiperdum*. *J. Infect. Dis.* 1960, July–Aug., v. 107, No. 1, 29–33.

GREWAL, M. S. **On a New Trypanosome,** *Trypanosoma helogalei* **Grewal, 1956, from the Blood of an African Mongoose,** *Helogale undulata rufula* **Peters (Peters' Pigmy Mongoose).** *Indian J. Med. Res.* 1960, July, v. 48, No. 4, 418–32, 126 figs. on 4 pls. [Numerous refs.]

" 1. A detailed description of a new trypanosome, *Trypanosoma helogalei* Grewal, 1956 of the African mongoose, Peters' pigmy mongoose, *Helogale*

undulata rufula Peters (class *Mammalia*, order *Carnivora*, family *Viverridæ*) is described.

" 2. Culture forms in N.N.N. and W.N. media and the experiments performed with them are described.

" 3. Possibility of infecting vertebrate hosts with cultures of more than 10 to 15 days is shown.

" 4. Mongooses, mice, rats, guinea-pigs and hamsters are found to be susceptible.

" 5. Ferrets and chickens are unsusceptible."

YAEGER, R. G. **Chagas' Disease in the United States.** *Rev. Goiana Med.* 1959, Oct.–Dec., v. 5, No. 4, 461–70, 3 figs. [25 refs.]

ZELEDÓN, R. La enfermedad de Chagas en Costa Rica. [**Chagas's Disease in Costa Rica**] *Rev. Goiana Med.* 1959, Oct.–Dec., v. 5, No. 4, 439–44. [16 refs.] English summary (7 lines).

HERRER, A. La enfermedad de Chagas en el Perú. Breve revisión de los conocimientos adquiridos hasta 1958. [**Chagas's Disease in Peru. Brief Review of Data acquired up to 1958**] *Rev. Goiana Med.* 1959, Oct.–Dec., v. 5, No. 4, 389–409, 1 map & 4 figs. [Numerous refs.]

NEGHME R., A. & ROMÁN P., J. Método epidemiológico aplicado a la investigación de enfermedad de Chagas en Chile. [**Epidemiological Method used in the Investigation of Chagas's Disease in Chile**] *Rev. Goiana Med.* 1959, Oct.–Dec., v. 5, No. 4, 323–7, 4 figs.

The English summary appended to the paper is as follows:—

" An epidemiologic method used in the investigation of the epidemiology of Chagas disease in Chile is discussed. The same method can also be applied to other diseases of chronic course and scarce clinical manifestation, striking the rural areas.

" By using this method from the Provinces of Atacama to O'Higgins, in those areas infested by triatomini from 1944 through 1948, it was possible to get an approximate idea of the extension of the disease in the country. Of the 14,756 persons who took the xenodiagnostic test, 12% were infected by the *T. cruzi*.

" Machado Guerreiro's complement-fixation serologic test was made on 10,862 patients and 14% gave positive result.

" The index trypano/triatomini was 44% among 20,952 triatomini examined, being uniform in the neighbouring provinces. As to the parasite reservoirs examined, in 4,006 animals *T. cruzi* was observed in 437 of them, which represents 10·9% infection."

De León, J. R. Estado actual de la enfermedad de Chagas en Guatemala. Resumen epidemiologico. [**The Present Status of Chagas's Disease in Guatemala. Epidemiological Summary**] *Rev. Goiana Med.* 1959, Oct.–Dec., v. 5, No. 4, 445–55, 1 map. [10 refs.]

The English summary appended to the paper is as follows:—

"I.—As part of a routine survey, 14 departments were explored by a team in charge of the epidemiological survey for a total of 12,272 residential visits over a five-year period; of these 1,355 residences were found infested by the hematophage reduvids encountered in the National Territory, table IV.

"II.—The Public Health Laboratory, Department of Trypanosomiasis and Leishmaniasis undertook in the same period of time a total of 17,888 dissections of the reduvids (table III); of these 3,903 were positive, i.e., 1,682 insects were S. cruzi carriers, 2,112 for T. rangeli and 109 showed mixed infestations for both trypanosomes.

"III.—The same Laboratory made 6,126 serologic examinations (Machado Guerreiro's reaction) for the indirect diagnosis of Chagas disease having found 859 positive reactions. As for the direct diagnosis, using the 'hanging drop', blood culture and xenodiagnosis, 168 positive cases of Chagas disease and a total of 77 cases of human infection caused by the T. rangeli (table I) were found.

"IV.—The anatomo-pathologist, Dr. Carlos Tejada Valenzuela, reported to the National Medical Meeting, the first contribution for the anatomo-pathological study of Chagas disease in Guatemala, having demonstrated the characteristic cardiac lesions in 44 cases.

"V.—Chagas disease in Guatemala shows a tendency to disappear as a result of the intra-domiciliary use of insecticides of residual effect which has been carried out by the National Service for the Eradication of the Malaria (N.S.E.M.), though not meant for that purpose and one can assume that the eradication of human trypanosomiasis is well advanced in the country and may even come before the eradication of Malaria."

Velázquez, C. J. & González, G. Aspectos de la enfermedad de Chagas en el Paraguay. [**Some Aspects of Chagas's Disease in Paraguay**] *Rev. Goiana Med.* 1959, Oct.–Dec., v. 5, No. 4, 357–73, 1 map & 5 figs. [12 refs.]

The English summary appended to the paper is as follows:—

"1—Fifty-nine cases of Chagas disease are presented and their main clinical features are reviewed;

"2—The true extent and geographical distribution of Chagas disease in the country cannot be established with accuracy until a nation wide epidemiologic survey of the disease is undertaken;

"3—The *Triatoma infestans* represents the only known species, up to the present time, as being able of transmitting the American trypanosomiasis in Paraguay."

Agosin, M., Neghme, A. & Scaramelli, N. **Non-Identity of Triosephosphate Dehydrogenase of Adult Male and Nymph Development Stages of** *Triatoma infestans*. [Correspondence.] *Nature*. 1960, June 25, v. 186, 1052–3, 1 fig.

De Paula e Silva, G. S. Manifestações da moléstia de Chagas no aparêlho digestivo. **[Manifestations of Chagas's Disease in the Alimentary Tract]** *Rev. Goiana Med.* 1958, Apr.–June, v. 4, No. 2, 149–60. [38 refs.]

The English summary appended to the paper is as follows:—

"1. The author, in his Report presented before the first Brazilian Seminary on Chagas' Disease, held in João Pessoa (Paraíba), Nov.-December 1957, emphasizes that its manifestations in the digestive tract are of clinical importance.

"2. During acute phase of Chagas' Disease there is a damage of the liver, revealed by clinical, laboratory and needle biopsy data.

"3. Megaesophagus and megacolon are, in Brazil, frequent in the same zone where trypanosomiasis is endemic. Almost all mega bearers have Guerreiro-Machado's test positive.

"4. An increasing group of Brazilian researchers believe that Trypanosoma cruzi is responsible for the destruction of the intramural nervous plexuses, which in turn is responsible for the development of megaesophagus and megacolon."

[See also this *Bulletin*, 1960, v. 57, 569, 571, 889.]

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Deane, L. M. Epidemiologia e profilaxia do calazar americano. **[Epidemiology and Control of Kala Azar in the Americas]** *Rev. Brasileira Malariologia.* Rio de Janeiro. 1958, Oct., v. 10, No. 4, 431–50. [119 refs.] English summary.

This is a useful summary of the present situation regarding kala azar in tropical America, where the disease is found in Mexico, Guatemala, El Salvador, Venezuela, Colombia, Ecuador, Bolivia, Paraguay, Argentina, Brazil and probably Dutch Guiana. The vast majority of cases have been reported from Brazil (2,145 in a total of 2,179, from all countries up to the year 1957), while in Brazil itself the infection is commonest in Ceará (1,653 cases). It occurs here in epidemic form in the foothills; young children are most commonly affected (58% of the cases being in the 1–4 years age-group, and 85% under the age of 10). Elsewhere the age distribution of cases is more uniform.

The wild-animal reservoir is the "fox" *Lycalopex vetulus* and the domestic reservoir is the dog; the infection is particularly common in dogs in towns (where the animal is more often affected than man himself, *e.g.* 39 dogs as against 2 human beings living in one town).

Phlebotomus longipalpis is incriminated as the principal vector of the infection in Brazil, because it is known to be easily infected after feeding on man or animals suffering from the disease, while specimens with anterior leptomonads have been found in nature in the states of Ceará and Bahia. Another possible vector is *P. cortellezzii*.

Climatic factors indicate that the infection prevails below 500 metres (the maximum altitude being 800 metres) with an annual rainfall of 1,000 mm. and in a relative humidity of 70%.

In Brazil, the disease has been controlled by the use of DDT, the destruction of dogs showing parasites in the skin or liver, and treatment of human patients with antimonial drugs.

[See also this *Bulletin*, 1958, v. 55, 262.] *P. C. C. Garnham*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

MOSING, H. Du rôle du pou dans l'étude du typhus exanthématique. Résultats de recherches sur l'epidémiologie de cette infection. [**The Role of the Louse in the Study of Epidemic Typhus. Results of Epidemiological Infections**] *Arch. Inst. Pasteur de Tunis*. 1960, June, v. 37, No. 2, 135–58, 5 figs. & 1 pl. [43 refs.]

This paper was intended for publication in 1958, in the special number of the *Archives de l'Institut Pasteur de Tunis* which marked the 50th anniversary of the discovery by NICOLLE of the part played by the louse in the transmission of epidemic typhus [this *Bulletin*, 1960, v. 57, 574]. The author discusses the great advances in the control of the disease and in the elucidation of its epidemiology which resulted from this discovery, and presents some of his own observations on the production of immunity by means of a vaccine of the Weigl type, on sporadic cases of typhus which he considers to have been examples of Brill's disease, and on the diagnostic value of a macroagglutination test performed with rickettsial antigens prepared from infected lice.

R. S. F. Hennessey.

LEVI, M. I., BASOVA, N. N. & SUCHKOV, I. G. **Characteristics of the Complement-Fixation Test in Certain Infections.** *Problems of Virology*. London. 1959, v. 4, No. 4, 72–9. [Translated from Russian.]

By cross-titrations of antigens and immune sera, the determination of the limiting titres of both, the examination of a zone phenomenon, and by calculation of indices for temperature and time variations of the test, a comparison was made of the results of the complement-fixation test in certain virus (lymphocytic choriomeningitis and influenza), rickettsial (epidemic typhus, murine

typhus, Q fever and North Asian tick typhus) and bacterial (plague and brucellosis) infections.

So far as temperature was concerned the test worked best at 4°C. in lymphocytic choriomeningitis, epidemic typhus, murine typhus, and plague. In brucellosis and North Asian tick typhus incubator temperature was best. In influenza good results were obtained at room temperature, while in Q fever the test was equally successful in the cold, at room temperature and with incubation.

The exposure time of the complement-fixation test was of definite importance. Longer exposure improved the results in influenza, North Asian tick typhus, Q fever and plague. The opposite was the case in epidemic typhus. The antigen of lymphocytic choriomeningitis virus was destroyed when exposed for a long time at comparatively high temperatures. The results were not appreciably influenced by lengthening the exposure time in brucellosis.

D. A. Cannon

MEL'NIKOV, L. A. **The Serological Diagnosis of Rickettsioses of the Typhus and Tick-Borne Spotted Fever Groups by the Haemagglutination Method. I. Typhus.** *Problems of Virology*. London. 1959, v. 4, No. 4, 111–15. [19 refs.] [Translated from Russian.]

Studying 127 sera from 94 patients with typhus in the 4th to 43rd day of the disease and 10 sera from persons who had had typhus 6 months to 30 years previously, the author concluded that the haemagglutination test was very sensitive, specific and quite suitable for the serological diagnosis of typhus. Mass serological tests could be done with blood from a finger. There was complete agreement in the results of haemagglutination, complement-fixation and rickettsial agglutination tests. Titres in the haemagglutination test ranged from 250 to 64,000, *i.e.* 10–30 times those in the complement-fixation and agglutination tests. The peak titre was between the 16th and 20th day of the illness.

The haemagglutination test was negative in persons who had recovered from typhus or who had been vaccinated or revaccinated against typhus.

D. A. Cannon

SHMELEVA, E. I. **The Influence of Cortisone on the Course of Typhus-Group Rickettsial Infection in Experimental Animals. I. The Influence of Cortisone on the Development of Typhus in Guinea-Pigs.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1959, v. 30, No. 8, 114–20. [19 refs.] [Translated from Russian.]

Guineapigs treated with 11 daily doses of cortisone ranging from 1·25 to 25 mgm. and inoculated intraperitoneally with *Rickettsia mooseri* on the 4th day showed retardation and shortening of the febrile reaction. Scrotal reaction was reduced in animals which received a total dose of 110 mgm. and suppressed by a total dose of 275 mgm., although large numbers of rickettsiae were present in smears from the tunica vaginalis. With total doses of 110 or 275 mgm. of cortisone, rickettsiaemia was prolonged and the development of complement-fixing antibodies occurred later than in untreated animals; titres rose eventually

to higher levels and persisted longer in treated animals than in controls. Cortisone-treated guineapigs which had recovered from murine typhus were found to be fully immune when challenged 3 months later with 10,000 infective doses of *R. mooseri*. *R. S. F. Hennessey*

SHISHIDO, A., OHTAWARA, M., HIKITA, M. & KITAOKA, M. **The Nature of Immunity against Scrub Typhus in Mice. II. The Cross-Protection Test with Mice for Identification and Differentiation of Several Strains of *Rickettsia orientalis* newly isolated in Japan.** *Japanese J. Med. Sci. & Biol.* 1959, Dec., v. 12, No. 6, 391–404, 4 figs. [Numerous refs.]

Cross-protection tests in mice immunized with a reference strain (Kato) of *Rickettsia orientalis* showed that 13 strains of rickettsiae recently isolated from field rodents collected in various parts of Japan and 1 strain of human origin (from a patient diagnosed as having Shichito fever, the winter type of scrub typhus) all belonged to the *R. orientalis* group. Among the rodent strains was one from the island of Hokkaido, for which the name *R. tamiyai* had been proposed on the grounds that its pathogenic and antigenic properties differed significantly from those of *R. orientalis*; on the results of the cross-protection tests, this strain appeared to belong to the same group as the others examined. Minor differences were noted among the 14 strains; thus, mice immunized with the Kato strain became resistant to some heterologous strains more quickly than to others, and the relationship between mouse LD50 titres estimated by subcutaneous and intraperitoneal inoculation showed marked inter-strain variation. [See also this *Bulletin*, 1959, v. 56, 934.] *R. S. F. Hennessey*

LI BIN. **Cultivation of *Dermacentroxenus sibiricus* in Lice and the Preparation of a Corpuscular Antigen from Lice.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1959, v. 30, No. 8, 76–82, 5 figs. [Translated from Russian.]

This paper describes the successful infection of lice with *Rickettsia sibiricus*. No rickettsiae were detected up to the 9th day in the first batch of lice inoculated by Weigl's method with washings from the tunica vaginalis of infected guineapigs, but a blind passage on the 10th day led to the appearance of rickettsiae in some lice 5 days later. From the 6th passage, all inoculated lice became infected, with rapid multiplication of rickettsiae between the 5th and 15th days. After the 10th passage, the rickettsiae became more pathogenic for lice, killing 40–50% in 16–20 days. Tests in guineapigs showed that rickettsiae from the 20th passage had retained the pathogenic and immunological properties of *R. sibiricus*.

Differential centrifugation of a formalinized suspension of infected lice gave an antigenic preparation which reacted positively in complement-fixation tests with antiserum for *R. sibiricus*, showing the same specificity as antigen prepared from yolk sac cultures. *R. S. F. Hennessey*

BORISOV, V. D., KARAKULOV, I. K. & AMENZHULOV, S. A. **The Present State and Future Prospects for Studies on [Q] Fever in Kazakhstan.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1959, v. 30, No. 8, 83–9. [14 refs.] [Translated from Russian.]

Complement-fixation tests for Q fever antibodies gave positive reactions with 401 out of 3,114 human sera (12·66%) collected in Kazakhstan during 1956–58; among the sera tested were 266 from patients with febrile illnesses, of which 48 (18%) were positive. Inoculation of guineapigs with blood from 12 patients with febrile conditions led to the development of complement-fixing antibodies in 5 animals. Analysis of results obtained with sera from persons in various occupational groups showed that the incidence of positive reactions was highest among persons who had direct contact with cattle (12·93% positives in 773 slaughterhouse workers, 16·07% positives in 56 dairy factory workers) and wool (19% positives in 100 workers at a wool factory).

In tests on 3,301 sera from farm animals in south-eastern Kazakhstan, 193 (5·84%) gave positive results. These included 114 positives out of 1,438 sera from sheep (7·92%), 64 out of 1,611 sera from cattle (3·97%), and 9 out of 67 sera from goats (13·4%). All the goats and 234 of the sheep had been imported from China and Mongolia; sera from 9·8% of these sheep were positive. Tests were also carried out on 24 sera from various species of wild birds; complement-fixing antibodies to *Rickettsia burneti* were detected in the sera of an eagle, a crow and a lark.

It is concluded that Q fever causes considerable damage to the health of the population as well as to the productivity of farm animals. The need for further studies is emphasized. A coordinated effort by medical and veterinary workers will be required to solve the problems of prevention, and "particular attention should be paid to improvement in the qualification of the local veterinary and medical staff as far as the infection in question is concerned".

[See also this *Bulletin*, 1958, v. 55, 1214.] *R. S. F. Hennessey*

IGNATOVICH, V. F. **The Course of Inactivation of *Rickettsia burneti* in Fluid Media.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1959, v. 30, No. 9, 134–41. [14 refs.] [Translated from Russian.]

The influence of temperature, *p*H and composition of the medium upon the rate of inactivation of *Rickettsia burneti* (Greta strain) was studied by titrating infectivity in chick embryos over periods up to 42 months. In each experiment, a standard preparation of dried egg material was diluted to 10^{-4}, corresponding to 10^5–10^6 infective doses for chick embryos; at this dilution, the protein content was 0·05—0·01%. Low temperatures (4–6°C.) and a weakly alkaline medium (*p*H 8) gave optimal survival. At 4–6°C., *R. burneti* remained viable in phosphate buffer (*p*H 8) containing 10% glycerol, or in skimmed cow's milk, for at least 42 months (with infectivity titres of 10^3 in both cases), and in tap water for 30–36 months; at 15–20°C., survival times in buffer with glycerol and in tap water were 12–16 months and 3–5 months respectively. In phosphate buffer media (without glycerol) of *p*H 5·0, 6·0 and 8·0, survival times at 4–6°C. were 8–9 months, 12–16 months, and 25–31 months respectively. Addition of glycerol prolonged survival at temperatures up to 15°C., and protein in the

media had a stabilizing effect at all temperatures. It was clear from the results that temperature and *p*H were the most important factors influencing the storage life of these rickettsiae. *R. S. F. Hennessey*

ALKAN, W. J. & BECHAR, C. **[Q Fever as a Cause of Hepatitis]** *Harefuah*. Jerusalem. 1960, Aug. 15, v. 59, No. 4, [in Hebrew 113–14. English summary 114].

The English summary appended to the paper is as follows:—

"In an unusual case of jaundice with prolonged pyrexia, a high blood sedimentation rate, leukocytosis, but without laboratory signs of parenchymatous liver damage, complement fixation for *Rickettsia burneti* rose to a titre of 1/320 and later fell to 1/60. The fever finally subsided after chloramphenicol was given. Only a few references to Q-fever hepatitis were found in the world literature, although Derrick (5) who first described this rickettsiosis in 1937, mentioned jaundice as a possible complication.

"On systematic study of our current cases of hepatitis we found that 3 out of 16 had Q-fever (in addition to 3 cases found previously). This was proved either by complement fixation or agglutination tests. Further investigations are being carried out in order to establish the role of *Rickettsia burneti* in cases of apparent infectious hepatitis. Serial liver function tests are also performed in all patients suspected of non-hepatic types of Q-fever.

"One of our patients lived on a cattle farm. Nine cows were examined and 5 of them had agglutinating antibodies against *Rickettsia burneti*."

[See also this *Bulletin*, 1957, v. 54, 24; 1959, v. 56, 936.]

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

CHRISTOPHERS, S. R. *Aëdes aegypti* **(L.) the Yellow Fever Mosquito: its Life History, Bionomics and Structure.**

This book was reviewed on p. 968.

THOMAS, T. C. E. **Notes on the Mosquitoes and Mosquito Borne Infections of Sierra Leone. (I) The Breeding Places of** *Aedes* **(*Stegomyia*) *aegypti* in and around Freetown.** *West African Med. J.* 1960, Aug., v. 9 (n.s.), No. 4, 163–8, 1 fig.

In Sierra Leone, in the vicinity of and in Freetown, *Aëdes aegypti* feeds on man by day, and possibly in the early night-time, but seldom rests by day in

houses. It often feeds outdoors on man. This investigation was made of its breeding habits to determine if it was an urban or forest mosquito. Survey was made from 1955–59 of natural breeding and breeding in bamboo pots in urban, rural and forest sites. Containers formed 73·6% of urban and 45·5% of rural breeding places, but in both sorts of places treeholes were commonly used also (53·8% and 34·4% respectively). Numbers of collections from containers approached 2,000, from treeholes up to nearly 200. About 16–17% of urban drains or pools bred the mosquito, but no breeding was found in numerous such places in rural situations. Bamboo pots revealed much less breeding in forest than more rural or urban sites. Density of human population, or more probably the breeding facilities or environment which go with it, seemed to encourage breeding. In general, available breeding places and pots were more commonly in use in the dry than the rainy season. In the rains, adult density was insufficient for all available breeding places to come into use. By contrast, *Aëdes africanus* bred less frequently in the dry season owing, it is suggested, to much reduced adult populations of this species. Such forest breeding of *A. aegypti* as occurred was only slight and in the dry season. It remains obscure whether this is a natural small forest population, a dry season invasion from less favourable rural and urban conditions, or linked with seasonal movements of man into the forest. It is concluded that *A. aegypti* is essentially an urban mosquito in Freetown and vicinity, which most resembles conditions in the Belgian Congo, less so those of Nigeria where semi-wild populations are substantial, and is unlike the wild populations of this species in forests of East Africa [see also this *Bulletin*, 1958, v. 55, 645].

D. S. Bertram

BOORMAN, J. **Observations on the Amount of Virus present in the Haemolymph of *Aedes aegypti* infected with Uganda S, Yellow Fever and Semliki Forest Viruses.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1960, July, v. 54, No. 4, 362–5. [12 refs.]

3 West African strains of *Aëdes aegypti* were used. They were infected by feeding on heparinized infected mouse-blood. Haemolymph was collected from anaesthetized insects with a capillary tube from a puncture between the 5th and 6th abdominal tergites. After feeds containing 4·6–5·3 log LD50 of Uganda S virus the haemolymph was found to contain virus from 2 to 98 days after infection, the estimated titres varying from 1·6–5·0 log LD50 per cmm. With Semliki Forest and yellow fever viruses similar results were obtained although fewer experiments were made. The intervals less than 24 hours after feeding were also studied and Uganda S virus was detected 10 minutes, 30 minutes and 2 hours after feeding. This suggests that virus may reach the haemolymph and hence all the tissues without prior multiplication in the gut cells.

C. E. Gordon Smith

DENGUE AND ALLIED FEVERS

SCHMIDT, J. R., SCHMIDT, M. L. & MCWILLIAMS, J. G. **Isolation of Phlebotomus Fever Virus from** *Phlebotomus papatasi*. *Amer. J. Trop. Med. & Hyg.* 1960, July, v. 9, No. 4, 450–54.

Sand-flies were collected in a part of Cairo where phlebotomus fever was endemic. They were collected resting in houses. Heads of females were removed for identification and the corresponding bodies later ground up. Between June and November 1959, 33,100 *Phlebotomus* were collected and of 8,727 females identified less than 1% could not be clearly designated as *P. papatasi*. Viruses were isolated from one pool of *P. papatasi* and 3 of unidentified *Phlebotomus* collected in August and October. 1–2-day-old suckling mice were inoculated and, in each case, from 1 to 3 became ill 16–19 days after inoculation. 3 isolates made in August consistently killed mice 6–10 days after inoculation by the 4th passage and titred 5·5–6·5 log. The October isolate killed mice only after 9–12 days at the 8th passage and titred only 4·5 log. Re-isolation was successful with all 4. Complement-fixation tests showed that all were identical with or closely related to the Sicilian strain of phlebotomus fever virus.

As only 4 strains had been isolated from 59 pools of about 400 sand-flies and because most of the sand-flies were engorged, some of the pools were tested for neutralizing antibody. In 3 pools of wild-caught *P. papatasi* neutralizing indices of 4,000, 2,000 and 20 were found while no neutralizing activity was found in pools of laboratory-reared, non-engorged *P. papatasi*. Evidently in such pools the odds were strong against successful isolation of virus.

This is the first record of isolation of phlebotomus fever virus from wild-caught *Phlebotomus* but the possibility must be entertained that some of the engorged flies were carrying infected blood. However, *P. papatasi* has previously been shown to be a vector experimentally [this *Bulletin*, 1944, v. 41, 1031]. *C. E. Gordon Smith*

BURGDORFER, W. & LACKMAN, D. **Identification of the Virus of Colorado Tick Fever in Mouse Tissues by means of Fluorescent Antibodies.** *J. Bacteriology*. 1960, July, v. 80, No. 1, 131–6, 4 figs. [11 refs.]

3-day-old mice were inoculated intraperitoneally with suspensions of ticks or blood from rodents. When the mice became sick 6–8 days later the hearts and brains were removed, quick frozen and sectioned. The sections were stained by immune rabbit globulin labelled with fluorescein isothiocyanate. Fluorescence was demonstrable in infected but not in various control preparations: the distribution of specific fluorescence was the same in 34 isolations of Colorado tick fever virus [see also this *Bulletin*, 1959, v. 56, 936, 937 *bis*].

C. E. Gordon Smith

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

HAFFKINE INSTITUTE. **Proceedings of the Symposia held during the Diamond Jubilee, Jan. 10 to 14 1959. I. Symposium on Plague** [pp. 1–36, illustrated. (Numerous refs.)] 154 pp. 1960. Bombay 12.

This symposium was appropriately opened by Dr. Karl F. MEYER (*The Pathogenesis of Cervical Septicemic Plague Developing after Exposure to Pneumonic Plague Produced by Intratracheal Infection in Primates*, pp. 1–12) who with A. LARSON described experiments carried out on plague infections of primates induced either by intratracheal instillation of *Pasteurella pestis* or by exposure of healthy monkeys to cage-mates with frank clinical plague induced by the experimental intratracheal method (*i.e.* primary pneumonic plague). More than half of the monkeys so exposed contracted plague originating in the respiratory tract, but there were two distinct types: the great majority of the animals contracted cervical bubonic septicaemic plague which was not contagious, but a small number, 4 out of 23, developed pneumonic plague from the inhaled infective material carried into the tissues of the terminal bronchioles and alveoli. The latter animals showed no lesions in the upper respiratory tract. The two different forms of the disease were probably associated with the size of the infective particles inhaled and the site of their deposition.

The second paper (*Experimental Respiratory Infection with Pasteurella pestis and Observations on Immunity to Plague*, p. 13) by Dr. D. W. HENDERSON (Microbiological Research Establishment, Porton) on experimental infections of guineapigs with *Past. pestis via* the respiratory route was closely related. Much of this work by Henderson and his colleagues had already appeared [DRUETT *et al*, *Bull. Hyg.*, 1956, v. 31, 848]; this was some years after Meyer's work, outlined above, had been completed.

This was followed by a paper by T. W. BURROWS (*Virulence Determinants in Pasteurella pestis and Past. pseudotuberculosis*, pp. 14–17) on the antigenic fractions of *Past. pestis* which are associated with virulence, another on the preparation of the *Casein Hydrolysate Plague Vaccine* (p. 18) now being made at the Haffkine Institute, described by Dr. M. K. HABBU, and finally Dr. S. C. SEAL gave a set paper on *The Conquest of Plague in India* (pp. 19–36). In considering the reservoirs and vectors of plague infection it is of interest to note that wild rodents, whose importance has been so clearly demonstrated in many other parts of the world where plague is endemic, do not, according to the author, play a very convincing role in India. *H. J. Bensted*

PITAL, A. **Growth Stimulation of *Pasteurella pestis* by a Combination of Coconut Water and Albumin Complex.** *J. Bacteriology*. 1960, June, v. 79, No. 6, 905–6.

This is a short note to indicate the growth stimulation of *Pasteurella pestis* when inoculated in small doses on to media containing a coconut water and albumin complex, in concentrations which are stated. The paper refers to

BLAUVELT [*Bull. Hyg.*, 1939, v. 14, 501] and to RAMAKRISHNAN *et al.* (*Nature*, 1957, v. 179, 1356). This is a preliminary report and the results of further studies are promised. *H. J. Bensted*

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

HAFFKINE INSTITUTE. **Proceedings of the Symposia held during the Diamond Jubilee, Jan. 10 to 14 1959. II. Symposium on Cholera** [pp. 37–51, illustrated. (Numerous refs.)] 154 pp. 1960. Bombay 12.

There were 6 papers in the cholera symposium: *The Pathogenicity of El Tor and NAG* [non-agglutinating] *Vibrios* (pp. 37–40) by Oscar FELSENFELD; *Some Studies on the Pathogenesis of Cholera* (pp. 41–43) by D. ROWLEY; *Role of Cholera Toxin in Production of Signs and Symptoms of the Disease* (p. 44) by N. K. DUTTA, M. V. PANSE and D. R. KULKARNI; *Some Activities of Bacteria-free Products of Vibrio cholerae* (pp. 45–46) by S. N. DE, M. L. GHOSE and A. SEN; *Genetic Exchange in Vibrio cholerae* (p. 47) by K. BHASKARAN; and finally *Immunochemistry of the Polysaccharides of Vibrio cholerae* (pp. 48–51) by D. L. SHRIVASTAVA.

There was nothing strikingly new in any of the communications as most of the information presented had already appeared in a somewhat different form in other publications. The relationship between the classical *V. cholerae* isolated during the early stages of the clinical disease, the non-agglutinating vibrios which are frequently reported from later examinations and the NAG vibrios isolated from cholera-polluted waters is still being intensively studied, but it is clear from these communications and all the other published information on the subject that at present there is no satisfactory answer to this problem. *H. J. Bensted*

GALLUT, J., with the technical collaboration of J. QUINIOU. Contribution à l'étude du complexe antigénique "O" des vibrions. Relations immunologiques entre *V. cholerae* et vibrions dits inagglutinables (NAG). [**Studies on the *Vibrio* Antigen "O" Complex. Immunological Relationships between *V. cholerae* and the so-called "Non-Agglutinable" Vibrios (NAG)**] *Ann. Inst. Pasteur.* 1960, July, v. 99, No. 1, 28–55, 3 figs. [24 refs.]

The strains of vibrios used in this investigation included representative cultures of the Ogawa, Inaba and Hikojima types of *Vibrio cholerae*, the Hikojima type of *V. El Tor* and a selection of NAG vibrios from water and animal sources. Each culture preparation was extracted with phenol and two fractions

were obtained—a phenol-soluble and a phenol-insoluble part. These two thermostable antigenic fractions from each culture preparation were purified for use as antigens for various serological tests and also for the preparation of the antisera employed in the precipitation, agglutination and haemagglutination tests. The International Standard cholera O antigen was also employed for control purposes.

Fraction I (phenol-insoluble) was the specific agglutinogenic and precipitinogenic polysaccharide. It was found that the polysaccharide extracts of cholera and El Tor vibrios had the specificity of their original type whereas the polysaccharide extracts of the non-agglutinating vibrios, which do not belong to the O sub-group 1, showed only a very variable relationship.

Fraction II (phenol-soluble) was protein in nature and contained the factors responsible for the non-specific haemagglutination and precipitation reactions. These factors were common to cholera and El Tor vibrios and also the NAG vibrios. In addition there was the non-specific protein agglutinogen (the common O antigen of GARDNER and VENKATRAMAN [this *Bulletin*, 1935, v. 32, 769] or the Q protein of Bruce WHITE [*ibid.*, 1936, v. 33, 374]).

The International Standard cholera O antigen was found to agglutinate red cells which had been sensitized with the phenol-soluble extract of any one of the vibrios tested, whether *V. cholerae*, *V. El Tor* or NAG vibrios.

H. J. Bensted

GHOSH, S. N. & MUKERJEE, S. **Studies on Antigens of *Vibrio cholerae* by Gel Diffusion Technique. Part I: Observations on the Antigenic Make-up of Soluble *Vibrio* Material.** *Ann. Biochem. & Exper. Med.* Calcutta. 1960, Feb., v. 20, No. 2, 31–6, 6 figs. [15 refs.]

Two types of antigens from cholera vibrios were tested: the soluble saline extracts of boiled vibrios and the soluble vibrio material from distilled water lysates of live *Vibrio cholerae*. A trichloroacetic-acid-precipitated fraction was also used. Inaba and Ogawa sera were prepared from living and heat-killed vibrios and also their soluble and insoluble fractions. Absorption technique followed the usual methods.

The gel diffusion technique used was a modification of FEINBERG'S method (*Trans. Collegium Internat. Allergol.*, 1958, p. 129, Switzerland, Karger) and the results were read after 5–10 days standing at room temperature.

Normal saline extracts were found to contain at least 4 distinct antigens, including specific and group antigens. 3 of these antigens appeared to be identical with the bands given by the trichloroacetic-acid-precipitated fraction. Distilled water lysates usually gave a single precipitation line, but such lysates after being boiled for one hour showed additional lines which resembled the lines given by extracts from boiled vibrios. *H. J. Bensted*

KRISHNA MURTI, C. R. **Action of Streptomycin on *Vibrio cholerae*.** *Biochem. J.* 1960, Aug., v. 76, No. 2, 362–9, 5 figs. [32 refs.]

This paper from the Central Drug Research Institute, Lucknow, describes in detail an extensive series of observations on the effect of dihydrostreptomycin

on the metabolic activities of *Vibrio cholerae*. Parallel tests were made with a strain of which the growth was inhibited by 2 μgm./ml. and a resistant variant of it which grew well in 2 mgm./ml. Measurements of oxygen uptake in the presence of tricarboxylic acid cycle intermediates showed that of the sensitive culture, but not of the resistant, to be reduced by the antibiotic when the substrate was acetate, fumarate or succinate, but there was no effect when it was malate. [Oxygen uptake in the presence of acetate was only reduced to about half by dihydrostreptomycin in concentrations varying from 16·7 to 83·3 μgm./ml. according to Table 1: the statement in the legend of Fig. 1, which shows this and other results graphically, that the flasks contained "33 g." dihydrostreptomycin should presumably be read as "33 μgm."] There was a similar effect in tests of the sensitive, but not of the resistant, culture, on the oxidation of some amino-acids and sugars. Succinic dehydrogenase and fumarase extracted from sensitive cells were partially inhibited by the antibiotic: the same enzymes from resistant cells were not. Dihydrostreptomycin affected protein synthesis in sensitive but not in resistant cells, as measured by the incorporation of ^{14}C-labelled glycine: this effect was less than that produced by chloramphenicol. *L. P. Garrod*

JOHNSTON, P. B. & GRAYSTON, J. T. **Studies of Gastrointestinal Viral Flora of Cholera Patients.** *Proc. Soc. Exper. Biol. & Med.* 1960, June, v. 104, No. 2, 293–5.

During the cholera outbreak in Bangkok in 1958–59 the stools of 44 cholera patients (severe classical cholera and also mild cases with few symptoms), from all of whom *Vibrio cholerae* had been isolated, were cultured in monkey kidney and HeLa cell tissue cultures for enteroviruses and also members of the adenovirus group. A similar investigation was made on a control group of 57 persons, family associates of the patients, who were clinically well and not excreting cholera vibrios.

A total of 6 viruses (3 adeno- and 3 enteroviruses) was isolated from the 44 cholera patients, and from the 57 healthy persons 12 virus strains (5 adeno- and 7 enteroviruses) were isolated. There was no evidence that the patients from whom the viruses were isolated could be differentiated in any other way from those not excreting these viruses; the various types of adeno- and ECHO viruses were well distributed. It is concluded that there is no evidence to suggest that the viruses which can be isolated from the stools of cholera patients by monkey kidney or HeLa cell tissue culture techniques are involved in the cholera syndrome. *H. J. Bensted*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

FUKUSHIMA, J. [**Studies on Encystment of** *Entamoeba histolytica in vitro*] *J. Osaka City Med. Center.* 1960, Jan., v. 9, No. 1, 131–46, 4 charts & 4 figs. on 2 pls. [37 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"An attempt was made to develop the best encystment medium for E. histolytica by testing so far employed media with the following results:

"1) Strain Y, H (Osaka University), S and H (Keio University) of E. histolytica formed numerous cysts in a liver extract medium and an encystment medium which were newly introduced by the author.

"2) Considerable difference in the rate and time for encystment was observed in the four strains of amoeba individually.

"3) The maximum encystment rate for the liver extract medium was obtained in the condition of the medium most suitable for growth of the vegetative form of amoeba.

"A proportional relationship existed, within certain limits, between the encystment rate and the growth rate of amoeba.

"4) A temporary elimination of rice starch from the encystment medium, sometimes promoted a cyst formation.

"5) Following alternate subcultures with the WB 1 medium and the liver extract medium, amoebae temporarily produced numerous cysts.

"6) A proper quantity of chloramphenicol and streptomycin promoted encystment of amoebae in the liver extract medium.

"7) A caecum juice of guinea-pigs which had been naturally cured of experimental amoebiasis, temporarily elevated the encystment rate in the liver extract medium.

"8) The cysts formed in the liver extract medium, were larger than those formed in vitro.

"9) The cysts formed in the liver extract medium, were slightly inferior in vitality and resistance to those formed in vivo. But their pathogenicity for guinea-pigs was not reduced.

"10) A semisolid liver extract medium which was developed by addition of agar to the original medium ingredients enabled amoebae to multiply over the medium showing an increase in the number of the parasites."

YAMADA, S. [**Studies on Body Passage of** *Musca vicina* **Macquart with Several Protozoa**] *J. Osaka City Med. Center.* 1960, May, v. 9, No. 5, 1523–40, 1 text fig. & 4 figs. on pl. [36 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"Observations were made of survival periods and biological characters of E. gingivalis, T. tenax, T. vaginalis and E. histolytica in the crop, intestines, feces and on the body surface of house flies (Musca vicina) and on some foodstuffs. The results obtained were as follows:

" 1) Each suspension of E. gingivalis, T. tenax, T. vaginalis and E. histolytica was ingested by a fly, at a quantity of about 3.24 cmm, 5.22 cmm, 5.22 cmm, 4.69 cmm and 3.63 cmm respectively on an average.

" 2) Both trichomonas survived in the intestines of flies for about 16–18 hours and 12 hours in the crop, but trophozoites of amoeba did not survive more than 2.5 hours. The cysts of E. histolytica survived for about 8–10 hours in the flies' intestine.

" 3) The surviving trichomonas were found in the feces of flies ranging between 2–3 hours and 8–9 hours after ingestion, and the cysts of E. histolytica between 2 and 6 hours. But the trophozoites of amoeba were not discovered in the feces of flies.

" 4) Each protozoan suspension is harmless to the flies on ingestion.

" 5) There were no significant changes about the biological characters of the protozoan on the passage through fly intestines.

" 6) A considerable survival period of the protozoan was observed on the fly body and on humid foods.

" A possibility of transmission of E. gingivalis, E. histolytica and T. tenax to humans through flies is suggested."

BAWA, Y. S. & WAHI, P. L. **Hepatic Amoebiasis.** *Indian Practitioner.* 1960, Feb., v. 13, No. 2, 193–9.

Analysis of 35 cases.

FUKUHARA, F. [**Immunological Studies on** *Entamoeba histolytica.* **(3) Relationship between the Immunological Reactions and the Pathology of Animals inoculated intracaecally or intrahepatically with** *Entamoeba histolytica*] *Japanese J. Parasit.* 1960, June, v. 9, No. 3, 239–45. [23 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

" Guinea pigs and rabbits were inoculated with *Entamoeba histolytica* intracaecally or intrahepatically and the immunological reactions of the serum and pathology of these organs were investigated. Intracaecally inoculated animals died or were killed 7–11 days after the inoculation, whole blood was drawn and pathology was examined. Intrahepatically inoculated animals died or were killed 1–17 days after the inoculation and were examined similarly as in the intracaecal cases. The immunological reactions performed were complement fixation test (CFT) and the immobilization test (IMT). The pathology in the colon was divided into 5 grades (0–4) according to the intensity. CFT titers were generally low and in the negative animals the intensity of infection was either 0 or 2. That means the infection did not occur or localized only in the mucous layer. In the CFT positive animals amoebae usually penetrated into submucous layer. The IMT titer showed generally a parallel relationship with CFT titer.

" In the intrahepatically inoculated animals, necrosis was detected almost

always around the injected site, though the size of the necrosis varied considerably. *E. histolytica* were rarely found in these necrotic tissues by the examination of direct smear and section preparations. CFT and IMT titer were much higher than in the cases of intestinal infections. Both titers showed parallel relationship with each other, but showed no relationship with the size of the necrosis in the liver."

RELAPSING FEVER AND OTHER SPIROCHAETOSES

FULTON, J. D.; SMITH, P. J. C. **Carbohydrate Metabolism in *Spirochaeta recurrentis*. 1. The Metabolism of Spirochaetes *in vivo* and *in vitro*** [FULTON & SMITH]. *Biochem. J.* 1960, Sept., v. 76, No. 3, 491–9, 1 fig. [Numerous refs.] **2. Enzymes associated with Disintegrated Cells and Extracts of Spirochaetes** [SMITH]. *Ibid.*, 500–508, 6 figs. [42 refs.] **3. Properties of Aldolase in Spirochaetes** [SMITH]. *Ibid.*, 508–14, 2 figs. [38 refs.] **4. Some Properties of Hexokinase and Lactic Dehydrogenase in Spirochaetes** [SMITH]. *Ibid.*, 514–20, 5 figs. [40 refs.]

HEISCH, R. B. & HARVEY, A. E. C. **Is *Ornithodoros savignyi* (Audouin) a Vector of Relapsing Fever in Africa?** *Ann. Trop. Med. & Parasit.* 1960, June, v. 54, No. 2, 205–7, 1 map.

Ornithodoros savignyi has long been regarded as an important vector of relapsing fever in nature [this *Bulletin*, 1926, v. 23, 854; *Bull. Soc. Path. Exot.*, 1908, v. 1, 577]. In Kenya the senior author transmitted *Spirochaeta duttoni* by this tick for the first time in 1947 [this *Bulletin*, 1950, v. 47, 629]. *O. savignyi* was believed to have been the vector in an epidemic of relapsing fever among troops in British Somaliland [*ibid.*, 1915, v. 6, 211] and also in Burao in the same Protectorate (*Ann. Med. San. Reports*, Somaliland, 1932–36, 1936, Appendix 2, 57). However, in these cases no ticks were tested and there is now little doubt that the vector of tick-borne relapsing fever in British Somaliland is *O. moubata* [this *Bulletin*, 1947, v. 44, 1070]. KIRK was unable to infect *O. savignyi* with an Abyssinian strain of *Spirochaeta recurrentis* [*ibid.*, 1939, v. 36, 762].

The present authors examined more than 2,000 specimens of wild *O. savignyi* from 2 places in Northern Kenya and 3 in British Somaliland (shown in a sketch map) during the last 12 years. Emulsions of ticks were inoculated intraperitoneally in monkeys in batches of 40–50 or in rats in batches of 10: in some early experiments, monkeys were fed orally. All the tests were negative.

The object of the authors' communication is to indicate that although *O. savignyi* can transmit *S. duttoni* in the laboratory, it does not yet appear to have been found infected with spirochaetes in nature.

H. J. O'D. Burke-Gaffney

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

TORSUEV, N. [La lépre dans l'empire Russe]. **[Leprosy in Imperial Russia]** *Sbornik Nauchnikh Rabot po Leprologii i Dermatologii* No. 10. 327 pp., illustrated. [In Russian.] French summary. 1958. Rostov-on-Don: Rostovskoe Knizhnoe Izdatelstvo.

SANSARRICQ, H. & DUCASSE, B. A propos d'un voyage d'études de léprologie. **[An Account of a Study Tour on Leprology]** *Méd. Trop.* Marseilles. 1960, July–Aug., v. 20, No. 4, 473–81.

The study tour took place from May to November 1959 under the auspices of WHO, and included Spain, the Belgian Congo and Venezuela. In Spain there are some 3,810 known leprosy patients, but it is thought that there may actually be between 8 and 10 thousand. The endemicity is irregular, varying from 0·477 per thousand in the Canaries and 0·373 in Andalusia to 0·093 per thousand in Galicia. Of the known cases 59·1% are lepromatous. The prophylactic campaign includes examination at least once a year of all contacts with known patients; BCG vaccination as a preventive is not considered practicable.

In Venezuela, with a population of over 2½ million in the areas specially affected, the number of known patients was 4·48 per thousand, of whom 40·44% had the lepromatous type of the disease. The incidence in the total population (7 million) was 1·77 per thousand. Most of these are treated with DDS tablets as ambulatory patients. The authors were particularly interested in the experiment conducted by CONVIT [see this *Bulletin*, 1957, v. 54, 834] in prophylaxis with BCG. In a colony of Germans, among whom there was a leprosy infection of 100·4 per 1,000, BCG vaccination was given in 1950 to 584 healthy persons, while 522 were controls. In the vaccinated group 5 years later there were only 3 tuberculoid cases, while in the controls there were 6 lepromatous, 3 borderline, 8 indeterminate and 8 tuberculoid cases. Writing from their point of view the authors consider that, if similar results elsewhere confirm these findings, then BCG vaccination could be adopted in the countries of Africa under French influence, but that even if such good results are not obtained BCG vaccination would be worthwhile because of its effects in tuberculosis.

In the Belgian Congo, with a population of over 12½ million, there were 155,362 known cases of leprosy, of whom 6·06% were lepromatous and 81·06% tuberculoid. The antileprosy campaign includes the systematic examination once a year of the entire population.

Reference is made to efforts at restoration and prevention of deformities and it is considered that this should be considered as a function of residential institutions; but the authors add that, important as this is, the chief emphasis should be placed on diminishing foci of infection by bringing under treatment as many patients as possible. *Ernest Muir*

MENEZES, D. Aspectos epidemiológicos e clínicos da lepra em Uruguaiana. [**Epidemiological and Clinical Aspects of Leprosy in Uruguaiana**] *Rev. Brasileira Leprologia.* S. Paulo. 1959, Oct.–Dec., v. 27, No. 4, 192–212, 3 figs. & 1 graph.

Uruguaiana is a town situated on the western frontier of the Rio Grande do Sul State of Brazil, with a population of 63,256. Between 1939 and 1959 there was a 100% increase of population. It has a semi-tropical climate with an average humidity of 72%, and a temperature varying from 38° to 0°C. Diet is precarious for the poor, and consists chiefly of meat; vegetables are not eaten much.

During the period of 20 years, 101 leprosy patients were registered. Of these 45 were lepromatous, 16 undifferentiated, and 40 tuberculoid. The sex incidence was 1 male to 1·06 female. There was 5·1 times more cases of leprosy among the white population than among those of mixed race, and 2·2 times more than among the Negroes. The incidence was highest among those aged 30–39 and least among those of 15 years of age. The coefficient among immigrants was 5 times as much as among nationals. The immigrant patients amounted to 17% and were mostly from Uruguay, and the second largest number came from Argentina.

In the control of the disease 606 people in contact with leprosy were registered. Out of 250 such contacts who were tested with lepromin (excluding those converted with BCG and those who developed leprosy) 98·4% gave a positive reaction. The incidence of leprosy was 77 times greater among the contacts not vaccinated with BCG than among those who were vaccinated.

Ernest Muir

SHEPARD, C. C. **Acid-Fast Bacilli in Nasal Excretions in Leprosy, and Results of Inoculation of Mice.** *Amer. J. Hyg.* 1960, Mar., v. 71, No. 2, 147–57. [11 refs.]

Arguing from analogy with experiences with tuberculosis the author suggests that viability studies on the leprosy bacilli should be made on bacilli taken from active lesions, and therefore nasal washings should form a convenient and reliable source of such bacilli.

The author, using 500 ml. Hanks balanced salt solution, obtained washings by means of a Nichols nasal siphon arrangement, and immediately after collection he added sterile bovine albumin to a concentration of 0·1%. The bacilli were concentrated by centrifuging, treated with caustic soda, and suspended in 2 ml. of Hanks solution + 0·5% bovine albumin. Microdrops were placed on slides, stained and the acid-fast bacilli present in these were counted. Cultures on Löwenstein-Jensen and 25% blood media were made from each sample, and some samples were also injected into the foot-pads of mice. The washings were taken from 35 patients at Carville leprosarium and from 25 patients at Tala, Philippines, and some of the patients were re-examined during treatment with sulphones.

The limit of detectability was found to be about 10^3 bacilli per sample and the number of bacilli present in the various samples ranged from below this limit up to 10^7. Microscopically the bacilli were frequently in globi and packets and differed from those in skin in being usually large and evenly stained, which suggests that they had high viability. Repeated daily washing for 4 days did not affect the counts which supports the contention that they were derived from active lesions. No acid-fast bacilli were grown in any of the cultures and although progressive granuloma developed in the foot-pads of the mice, and in one instance the bacilli were successfully passaged 3 times, the author did not consider that he had obtained proof of multiplication of the organisms. [In the text the author states that there was a total bacillary increase of $2{\cdot}4 \times 10^4$-fold during the 3 passages.] After a while these granulomata receded, with the bacilli decreasing in number and becoming beaded.

In contrast to the findings of DOULL *et al.* [this *Bulletin*, 1959, v. 56, 844], the number of bacilli in the washings decreased during sulphone therapy, but this may be due to the other workers having examined scrapings and thus perhaps having counted stored bacilli, whereas a fall in the present author's counts is indicative of a reduction in the multiplication of the bacilli.

S. R. M. Bushby

DE SOUZA, P. R., DE AZEVEDO, M. P. & DE CASTRO, Maria P. *Mycobacterium leprae* em cultura de tecido. [*M. leprae* **in Tissue Culture**] *Rev. Assoc. Med. Brasileira.* 1959, Dec., v. 5, No. 6, 408–12, 6 coloured figs. on pl. [19 refs.] English summary.

After mentioning the work of HANKS [this *Bulletin*, 1947, v. 44, 721, 722 *bis*] and others the authors describe their own attempt to culture *Mycobacterium leprae* in cells. As this organism grows intracellularly in the tissues it cannot be expected to grow outside the body except in cells. As the cells of malignant tumours are easier to cultivate than normal cells, they were used for tissue culture.

A biopsy was taken from a malignant tumour in a leprous patient. The fragment of tissue was washed several times in Hanks solution containing antibiotics and then divided into smaller fragments which were placed in 0·2% trypsin in Hanks solution to which were added hydrolysed lactalbumin with weak penicillin and streptomycin. The further processes are described in detail.

Examination showed that there were no bacilli in the malignant cells immediately below the epidermis, but that there was mild lepromatous infiltration in the deeper part of the dermis, connected with the cutaneous nerves. This was taken to mean that there had been phagocytosis of the bacilli during the " steps of the trypsinization of the material ". Intracellular bacilli were observed until the seventh cell passage during 120 days of incubation in the form of single bacilli, globi and cell packs. No degenerative bacilli were seen in the cells, but extracellular bacilli were quickly reduced to masses of acid-fast substance.

The authors think there is evidence that this type of cell may provide the material of choice for the culture of lepra bacilli. *Ernest Muir*

De Souza-Araujo, H. C. **Attempts to obtain Mitsuda Reactions in the Skin of Leprosy Patients, using Fresh Suspensions of Nodules produced in Black Mice by Inoculations of *M. leprae*: Greatly Increased Virulence of *M. leprae* by Passage through Black Mice.** *Leprosy Review*. 1960, Apr., v. 31, No. 2, 92–6, 4 figs. on 2 pls.

The author transmitted infection with *Myco. leprae* to "black mice of American race" and produced subcutaneous nodules with lepromatous structure, or abscessed lesions. With material from these nodules, unboiled, he inoculated 7 volunteer leprosy patients so as to test therewith their skin reaction. The inoculum caused strong local reaction in all the 7 patients, a reaction which differed clinically and histopathologically from that of the Mitsuda skin test. Later, he used the same inoculum after boiling it to inoculate 10 other patients; and 5 of them, N2 and N3 in type, gave a 1-plus reaction, 2 others (of regressive L type) were doubtful, while 3 L2 and L3 cases were completely negative. It is concluded that this boiled antigen "gave results not different from the classical Mitsuda Test".

Details of the tests in each volunteer are given. *Ernest Muir*

Bechelli, L. M., De Souza, P. R. & Quagliato, R. Correlação entre os resultados da leitura clínica e do exame histopatológico da reação de Mitsuda. [**Correlation between the Clinical Reading and Histopathological Examination of the Mitsuda Reaction**] *Rev. Brasileira Leprologia*. S. Paulo. 1959, Oct.–Dec., v. 27, No. 4, 172–82. [21 refs.] English summary.

This article describes work in continuation of a previous publication in 1957 [this *Bulletin*, 1957, v. 54, 1194]. The study includes the results of the Mitsuda reaction in 293 subjects, including 139 previously studied. Of the total, 62 were healthy persons who had been in contact with leprosy, 52 were healed lepromatous patients, 82 had indeterminate type, 93 tuberculoid and 4 dimorphous. The lepromin used was prepared according to the Mitsuda-Hayashi method, and clinical readings were made by the method adopted at the Madrid Congress.

Histological findings were divided into 3 categories: (a) positive, where there was chronic inflammatory infiltrate with chiefly epithelioid cells of tuberculoid type and few or no bacilli; (b) negative, where there was simple inflammatory infiltrate with few or no bacilli, or granuloma with many bacilli but with histiocytes and no tuberculoid structure; (c) chronic inflammatory infiltrate, partly granulomatous and partly with epithelioid cells, with a few giant cells and few or no bacilli. It was found that where there was negative or strongly positive clinical reading the histological picture was that of (b) or (a) respectively. When the clinical reading was doubtful the histological picture showed a certain degree of resistance in about one-third of cases.

It is considered that a negative histology in leprosy patients with a 1- or 2-plus Mitsuda reading indicates a less favourable course of the disease in some of them. It is suggested that possibly in future it may be well to classify together patients with 1-plus and those with 2-plus reactions, counting them 1-plus because of their histological resemblance; while those with 3-plus reaction would be classified as 2-plus. *Ernest Muir*

MORENO, S. R. Viragem do Mitsuda pelo B.C.G. em filhos de hansenianos. **[Conversion of the Mitsuda Reaction by BCG in the Children of Leprosy Patients]** *Rev. Brasileira Leprologia.* S. Paulo. 1959, Oct.–Dec., v. 27, No. 4, 183–91.

An account is given of the effect on the Mitsuda reaction produced by vaccination in 264 children between the ages of 2 and 19 years. Before vaccination the percentage of those with 2-plus and 3-plus lepromin reactions was 57·57, while the percentage of positive Mantoux reactions was only 15·50. This high lepromin reaction compared with low tuberculin reaction indicated that the resistance was of the direct and not the crossed type.

Of the 105 Mitsuda-negative children vaccinated with BCG 36·19% became positive. Among those who were given BCG orally the conversion was 38·88%, when given by injection it was 40·54% and among unvaccinated controls it was 28·12%. Out of 44 1-plus positives 75% were converted to 2- or 3-plus.

The author prefers the oral method of vaccination as it gives results nearly as good as by injection, is easy to administer without specialist personnel, gives no complications, and is innocuous as shown by giving up to 50 mgm. a week.

Ernest Muir

MAYAMA, A. **[Immunological Studies with Serum Lipoprotein Fractions isolated from Leprosy Patients]** *Lepro.* 1960, Mar., v. 29, No. 2, 100–103, 3 figs. [11 refs.] [In Japanese.]

The English summary appended to the paper is as follows:

"Low density lipoprotein fractions were obtained from the sera of leprosy patients by preparative ultracentrifugation at 40,000 r.p.m. (107,000 ×g) and solvent 1.063 g. per ml. for 8 hours. The effect of the fractions on phagocytosis of leucocytes from leprosy patients against tubercle bacilli was investigated. The phagocytic power of the leucocytes in the medium containing the serum lipoproteins was stronger than in the medium containing the serum itself. The antigenicity of the lipoprotein fractions, isolated from the sera of lepromatous or tuberculoid leprosy patients was also examined. Antisera for these fractions were produced in rabbits or chickens in usual manner. And then, the techniques of agar diffusion and agar immunoelectrophoresis were applied to the study. There was a marked difference in antigenicity between the fractions obtained from tuberculoid and those from lepromatous leprosy patients. The antibodies were not demonstrated in the antisera against lepromatous serum lipoprotein fractions. It was apparent that the fractions isolated from the sera of tuberculoid leprosy induced formation of antibodies against the sera and the serum lipoprotein of leprosy patients."

UTKU, E. Le test de Nelson et les réactions faussement positives dans la lèpre. **[The Nelson Test in Relation to Biological False Positive Reactions in Leprosy]** *Türk Ijiyen ve Tecrübî Biyoloji Dergisi.* Ankara. 1960, v. 20, No. 1, 95. [Fuller version in Turkish 93–4.]

All of 50 sera were negative.

PRICE, E. W. **Studies in Plantar Ulcer in Leprosy. V. The Complications of Plantar Ulcer.** *Leprosy Review*. 1960, Apr., v. 31, No. 2, 97–103, 6 figs. (4 on 4 pls.) [12 refs.]

This is the fifth in a series of articles on plantar ulcers in leprosy [this *Bulletin*, 1960, v. 57, 139], and deals with 6 complications which may occur.

(1) Subcutaneous plantar infection occurs owing to breaking of the skin of the lesion. It is important therefore to recognize infection without ulceration. Deep necrosis without infection produces pain which will subside with a few days' rest. If it does not subside antibiotics and rest should be given. When in doubt the swelling should be aspirated before opening.

(2) Bone and joint infection may be masked by anaesthesia. An illustration shows how near the synovial membrane of the ankle joint approaches to the sites of plantar ulceration. The collapse of the medial longitudinal arch indicates grosser damage to the foot.

(3) Phlebo-thrombosis of the foot and lower leg starts near ulcers and spreads along deep channels into the calf. Repeated attacks of fever and swelling occur, and the over-lying skin may become eczematous. Chronic lymphoedema, though less common, is also apt to recur; in this the venous circulation is not affected nor is the healing of sole ulcers.

(4) Another condition is the chronic oedema of disuse. There is swelling of both feet including the sole, and splaying of the toes, but the skin does not pit on pressure. Institutional treatment for increasing the circulation is called for.

(5) The neuropathic (Charcot) joint resembles that seen in diabetes. With anaesthesia present, it may be difficult to distinguish from spreading infection. But there are no signs of inflammation or joint fluid, and X-ray shows general decalcification. There may be spontaneous fractures.

(6) The last complication described is the results of metatarsectomy. The author objects to this operation as other ulcers may occur and footwear is difficult to fit; but the chief objection is " the knowledge that healing of a chronic ulcer can be achieved by other non-traumatic methods ". *Ernest Muir*

RAMANUJAM, K. **A Report on the Use of Chloroquine Sulphate in Lepra Reaction.** *Leprosy Review*. 1960, Apr., v. 31, No. 2, 104–9.

A report is given of the use of chloroquine sulphate in 27 patients suffering from lepra reaction. The " Nivaquine " brand of this drug was given in doses of 400 mgm. [300 mgm. chloroquine base] daily till symptoms began to abate, and then, gradually, 200 mgm. daily. Out of 21 patients with acute reaction 9 showed complete relief and 12 showed improvement. In two patients who had had continued reaction for a long time and were unable to take DDS in consequence, it became possible after periods of chloroquine treatment to continue DDS in small doses. The author considers that intravenous antimony gives quicker results in acute reaction, but for chronic and recurring reaction, especially when the treatment is ambulatory, he considers that chloroquine may prove of great value and deserves further investigation. Toxic manifestations were of a mild nature and easily controllable.

[See also this *Bulletin*, 1959, v. 56, 730; 1960, v. 57, 40.] *Ernest Muir*

CHAUSSINAND, R. & BOURCART, N. **Grave Relapse of a Lepromatous Leprosy Patient treated for Six Years with the Sulphone J. 51.** *Leprosy Review.* 1960, Apr., v. 31, No. 2, 116–19. [Translated from *Presse Méd.* 1959, Aug. 29, v. 40, 1534.]

This is an account of a patient who lived in Indo-China from 1924 to 1946, where he apparently contracted leprosy. He was not diagnosed till he came to Paris in 1948 when he was in an advanced lepromatous stage. He was treated from 1949 to 1955 with sulphone J.51 tablets of 50 mgm. each, receiving 3 tablets daily for the first 2 years, diminishing to 2 and then to 1 tablet for the last 2 years. It is calculated that this form of sulphone has the equivalence of about a quarter of the amount of DDS. However, the patient improved and stopped treatment in 1955 as he was supposed to be cured. In 1957 there was a relapse, which was not diagnosed, however, for some 16 months, by which time he was again in an advanced lepromatous condition. This, however, responded satisfactorily to treatment with DDS. The authors point out the importance of doctors being able to diagnose leprosy in its early stages. They show the danger of giving doses of sulphone which are insufficient. Nevertheless they note that the patient improved even on such small doses, the equivalent of 39 to 13 mgm. a day of DDS, which should have induced the occurrence of resistance to sulphones, and that the introduction of new treatment by weak doses of DDS still produced in a short time a remarkable improvement in the cutaneous lesions. *Ernest Muir*

LANGUILLON, J. & BOISSAN, R. H. Note sur l'évolution des lésions osseuses des extrémités chez le lépreux après traitement sulfone. [**Note on the Evolution of Osseous Lesions of the Extremities in Leprosy after Sulphone Treatment**] *Méd. Trop.* Marseilles. 1960, July–Aug., v. 20, No. 4, 482–92, 1 fig. [Numerous refs.]

After quoting the work of similar nature by LECHAT and CHARDOME in the Belgian Congo [this *Bulletin*, 1958, v. 55, 900] the authors describe their own experience with 282 patients of whom 165 were lepromatous, 102 tuberculoid and 15 undifferentiated.

Comparison was made of radiograms taken between January and May 1959 with those taken in the beginning of 1960, sulphone treatment having been given in the interval. At the beginning 45·6% of the patients had lesions of the bones; at the end of the period 48·59% had lesions. Of the 137 patients with lesions at the end of the period 44 showed no changes in their lesions. Of the 70 patients in whom lesions had increased 60 had either perforating ulcers or abscesses, and 85% of them were due to exogenous superinfections. New lesions in the phalanges were caused by single or multiple cystic foci, which tended to become shut off as geodes or to invade the joints.

When healing takes place it is characterized by claustration of small foci of bacilli which remain quiescent within. Curiously, this "healing" is most commonly found in the lepromatous type. The authors come to the conclusion that the sulphones are totally inefficient in stopping the evolution of pre-existing osseous lesions. [Nothing is said about precautions to prevent pressure,

burning or other injuries; or about physiotherapy and other methods of restoring mobility and function.] *Ernest Muir*

REES, R. J. W., VALENTINE, R. C. & WONG, P. C. **Application of Quantitative Electron Microscopy to the Study of *Mycobacterium lepraemurium* and *M. leprae*.** *J. General Microbiol.* 1960, Apr., v. 22, No. 2, 443–57, 9 figs. on 2 pls. & 1 text fig. [25 refs.]

HANKS [this *Bulletin*, 1955, v. 52, 1100] reported that *Mycobacterium lepraemurium* in phosphate buffer at 37°C. for 28 days loses almost all its viability but remains fully infectious at 4°C. MCFADZEAN and VALENTINE [*ibid.*, 1960, v. 57, 141] showed that the suspension of the bacillus kept at 37°C. had changed morphologically when examined under the electron microscope, for the bacilli, instead of being more or less uniformly dense, consisted of a cell wall that was empty except for disorganized material.

In the present paper the authors have confirmed the morphological changes, and they show that the proportion of changed bacilli is inversely proportional to the infectivity of the suspension, measured by ability to produce a leproma when injected intradermally into mice. *Escherichia coli* was also shown to undergo similar changes, and the reduction in the viable counts of suspensions of the bacilli paralleled within 5% the increase in the proportion of bacilli showing this change. This change did not develop in bacilli that were killed by exposure to acid, ultraviolet light or rapid cooling, even when the bacilli were left in the phosphate buffer for 28 days at 37°C. In mice with a well established *Myco. lepraemurium* infection and then treated with isoniazid, the number of changed bacilli increased from 9–92% and many of the bacilli also developed a beaded appearance when stained by the Ziehl-Neelsen method. The change was also observed in bacilli in tissue cultures in which the tissue cells had degenerated but not in healthy cultures, and the proportion of bacilli showing this change increased when isoniazid or streptomycin was added to the cultures. The authors also identified a third distinct morphological change in which the bacillus was then divided into many clearly outlined and frequently dense bodies; this change occurred in a medium containing a high concentration of citrate, and viability tests indicated that the bacilli were dead.

These forms of bacilli were found to be present in suspensions of human leprosy bacilli from untreated patients and ranged from 41–93%. Many of the bacilli in human cases are generally regarded as being beaded in Ziehl-Neelsen preparations and these bacilli are often considered to be dead; the proportion of bacilli showing this beading in the suspension examined was approximately the same as those showing the electron-microscope change, but although the proportion of bacilli with the latter morphology increased when the bacilli were left in the buffer solution at 37°C., the proportion showing the beaded appearance remained unaltered.

These observations are described at some length and the authors conclude that these changes seen under the electron microscope indicate death of the bacilli in the host and during storage, and that death in the host but not during storage can be measured by a simple classification of the bacilli seen with the light microscope after Ziehl-Neelsen staining. *S. R. M. Bushby*

De Souza-Araujo, H. C. **I. Bacteriology of Rat Leprosy: Electron Micrographs of Rat Lepromas and Cultures. II. Bacteriology of Human Leprosy.** *Leprosy Review.* 1960, July, v. 31, No. 3, 178–88, 7 pls.

The author mixed 1 part of Hydrazide (Schering) [a 10% solution of isonicotinic acid, 1 cc. containing 100 mgm.] with 1 part of a suspension of rat leproma, and inoculated batches of white rats and black mice. From the lesions produced he was able to obtain a mixed white and yellow culture, which he was able to separate by successive transplants in Loewenstein medium. The yellow strain is strongly acid and alcohol fast, as is also the white strain. The former is a medium sized bacillus, while the latter shows the aspects of a fresh suspension of rat leproma. The Hydrazide did not change the staining properties of the rat leprosy bacilli or prevent them from reproducing the disease in rats. Photographs are given of certain strains of acid-fast organisms which the author has cultivated. There are also shown several plates of electronmicrographs of mycobacteria, which are considered to show resemblances to *Mycobacterium leprae*. *Ernest Muir*

HELMINTHIASIS

*In this section abstracts are arranged as far as possible in the following order:—*Trematodes *(schistosomes, other flukes);* Cestodes *(Diphyllobothrium, Taenia, Echinococcus, other cestodes);* Nematodes *(hookworms, Ascaris, filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).*

Lupaşcu, G., Ungureanu, E., Nitulescu, V., Dumitrescu, V., Popescu, G., Dahnovici, V., Agavriloae, A., Sorescu, A., Corijescu, V. & Panaitescu, D. Răspîndirea helmintiazelor în R.P.R. **[Distribution of Helminthiases in the R.P.R.]** *Microbiol., Parazitol., Epidemiol.* Bucharest. 1960, Mar.–Apr., v. 5, No. 2, 121–42, 8 figs. [Numerous refs.]

The incidence of various helminthiases in Rumania is described on the basis of data for 1950–57 supplied by the malaria and helminthiasis stations. During this period the number of persons investigated annually rose from 16,665 to 780,968, and the proportion found to be infected with worms ranged from 27·5% to 37·39%, with a somewhat lower incidence over the latter half of the period. The commonest infection was with *Ascaris lumbricoides* (mean incidence over the whole period 16·2%), followed by *Trichuris trichiura* (9·5%), *Enterobius vermicularis* (4·5%), *Hymenolepis nana* (3%), *Diphyllobothrium latum* (0·35%) and *Taenia solium* with *T. saginata* (0·28%). The number of cases of hydatid disease observed annually ranged from 806 to 1,745, and of trichinosis from 20 to 241. The geographical distribution of the individual infections is shown in a series of maps. *D. J. Bauer*

GLASS, J. **Further Clinical Trial of a New Anthelmintic Dilombrin (Pfizer) Brand of Dithiazanine.** *J. Roy. Nav. Med. Serv.* 1960, v. 46, No. 2, 75–8. [11 refs.]

The author carried out a series of clinical trials of this enteric coated preparation of dithiazanine [the salt used is not stated], in massive doses over short periods, ranging from 3 to as short as 1 day. Individual doses ranged from 500 mgm. to 1,000 mgm. and were administered either thrice or twice daily: the total amount of the drug given varied from 2·0 to 4·5 gm. Each tablet contained 100 mgm. of dithiazanine.

The subjects were infected with *Ascaris lumbricoides*, *Trichuris trichiura*, *Ancylostoma duodenale* or *Enterobius vermicularis*; multiple infections were common.

In the case of ascariasis and trichuriasis high dosage for 1 day, 2·0–2·7 gm., proved rather more effective than a lower daily dosage spread over 3 days, though the numbers of patients treated are too small for statistical analysis. Toleration of high dosage over 1 day was excellent, but the appearance of incompletely disintegrated tablets suggested that the enteric coating was too efficient for the impaired digestive secretions of some patients.

The only 2 patients with ankylostomiasis received 500 mgm. t.i.d. for 3 days, and neither was cleared of his infection. The only patient with *Enterobius* was cleared by 2·4 gm. in one day.

The author suggests that tablets of greater size and with a thinner coating would be useful. [For an earlier study by the author, see this *Bulletin*, 1960, v. 57, 379.] *J. H. Walters*

HAHN, S. S., KANG, H. Y. & HAHN, Y. S. **The Anthelmintic Effect of Bephenium Hydroxynaphthoate on Intestinal Helminths.** *J. Trop. Med. & Hyg.* 1960, Aug., v. 63, No. 8, 180–84. [17 refs.] [Translated from *J. Korean Med. Ass.* 1960, v. 3, 40.]

Recently, quaternary ammonium compounds—bephenium salts—have been found to be active against a broad range of parasitic nematodes in domestic animals and the drug appeared to be more active against nematodes attached to the mucosa than those living free in the lumen.

For this trial, 203 patients infected with *Ancylostoma duodenale*, *Ascaris lumbricoides*, *Trichostrongylus orientalis* and *Trichuris trichiura* were selected from hospital patients and out-patients at Seoul National University Hospital. Of these, 171 had multiple infections.

The numbers of patients infected by the various helminths were: *A. duodenale* 153, *T. trichiura* 109, *T. orientalis* 75, *A. lumbricoides* 78. There were 121 males and 82 females and ages ranged from 19 to 57.

Bephenium hydroxynaphthoate (Alcopar) in a single dose of 5·0 gm. containing 2·5 gm. of base, was given to each patient before breakfast without purgation, dietary restrictions or bed rest. Faeces were examined by various methods before and after administration of the drug. 98% of 153 patients infected with *A. duodenale* were completely negative after this treatment. 78 cases of ascariasis were similarly treated and an 82·1% clearance was obtained. The same therapy was effective in 77·3% of 75 patients infected with *T.*

orientalis. With the same regimen elimination of whipworms was obtained in 41·3% in 109 patients.

Toxic effects were studied in 144 cases. 45·8% were free of untoward effects. Some of the remainder developed diarrhoea, abdominal pain, nausea, vomiting, vertigo and anorexia. Mild diarrhoea should be considered advantageous in eliminating dead worms.

As reported in this paper bephenium hydroxynaphthoate was more efficacious than in some previous reports [this *Bulletin*, 1959, v. 56, 639, 750]. This may be attributable to the fact that *A. duodenale* is commoner in this region than *N. americanus* and seems to be more susceptible to this drug. The drug is also effective in infections by various other nematodes.

[See also *ibid.*, 1960, v. 57, 924.] *Philip Manson-Bahr*

Epidemiological & Vital Statistics Rep. W.H.O. 1960, v. 13, Nos. 6/7, 315–47. [78 refs.] [In Parallel French & English.] **Bilharziasis in Various Countries.**

These statistics will prove most valuable to all who wish to obtain information on the global incidence of schistosomiasis. There are inevitably shortcomings in the figures since in many of the countries concerned accurate statistics cannot always be obtained. Also it is admitted that the figures are not comparable and a useful footnote quotes from a WHO questionnaire in which the problem of the proper recording of schistosomiasis is described.

Nevertheless the figures are those published in official national reports or in published surveys and they represent an extremely wide range of information. The first table shows the number of cases and deaths by continents and countries: where possible the species of schistosome is named, but in most cases it has been possible to give figures for vesical or intestinal schistosomiasis only or even for schistosomiasis without further classification.

The second table gives the results of a very large number of surveys, locality by locality. This occupies no less than 19 large pages. In each case the nature of the population group is given, the number of persons examined, the number and percentage positive, the species of parasites, and relevant remarks. References are given in the table to each survey, and the 78 relevant references are set out in full at the end. *H. J. O'D. Burke-Gaffney*

Honey, R. M. & Gelfand, M. **The Urological Aspects of Bilharziasis in Rhodesia.** *Central African J. of Med.* 1960, Jan., Feb., Mar., Apr., May & June, v. 6, Nos. 1, 2, 3, 4, 5 & 6, 1–5; 58–61; 109–11; 153–5; 199–212; 248–59, 38 figs. [28 refs.] [Published in book form by E. & S. Livingstone Ltd., 16–17 Teviot Place, Edinburgh. Price 7s. 6d.]

This paper appears in 6 parts in corresponding serial numbers of the journal. Part 1 supplies the background to the studies in Salisbury hospitals. 300 European and 100 African patients provided the material for the observations, which are detailed and extensive and extend over about 20 years. Urinary schistosomiasis is manifest rather differently in the Europeans and in the Africans seen in Rhodesia and Nyasaland. In the Europeans the urological

complications are detected early, when fibrotic changes are becoming evident; and this is usually some time after the actual worm infection has been eradicated by treatment. The African, on the other hand, rarely is seen until these complications are advanced and serious and in him the worm infection often persists, therefore there are concurrent active lesions; most of these African patients are still under 25 years of age. Though the urological complications of schistosomiasis met with in the European may cause chronic pain and ill health they rarely cause his death; but in the more advanced involvement seen in the African these complications are serious and may well cause death. *Schistosomiasis in any stage, in spite of the previously stated views, "should never be dismissed as being merely a benign disease"* [abstracter's italics].

In discussing the pathology of the bladder involvement in *Schistosoma haematobium* infection the authors are entirely satisfied that the presence of only dead eggs in the urine does not imply that there is no active worm infection; only living eggs escape into the urine; there they may have died and be seen as dead eggs. Calcified eggs are not found in the stools or the urine; dead eggs are not extruded from the bladder or rectal mucosa as foreign bodies, but are retained in tissue. Though great numbers of dead *S. haematobium* eggs are known to occur in rectal mucosa the recovery of these eggs in stools is exceptional. Calcification around dead eggs in time follows fibrosis in tissue; when there are many dead eggs the resultant calcification can increasingly be seen in the bladder wall and extending up the ureters even to the renal pelves.

Cystoscopically, the earliest lesions, seen usually on the base of the bladder, are tubercles; these with pallor of the mucosa are the usual evidence of the disease in Europeans. In Africans in addition to these there are sandy patches, which are evidence of old-standing infection; these patches are accumulations of innumerable tubercles. Still later are to be seen areas of readily-bleeding granulation tissue adjacent to sandy patches; this tissue may become pedunculated, and later even avascular and calcified, thus forming a "hanging calculus". Small (2 mm.) cysts occasionally develop.

Fibrosis causes rigidity of the bladder, with an inability to expand, and so increased pressure in the ureters and renal pelves and their dilatation. The resultant damage to the kidney tissue, with hydronephrosis, is one of the major causes of uraemia and death in the African—without stenosis of the ureters. Sometimes, on the other hand, the bladder wall becomes thin and atrophic, thus increasing its capacity and rendering it liable to rupture. Fibrosis and obstruction of the neck of the bladder is said to be common in Egypt; but it is not so among either the Africans or the Europeans in the area in which the authors work. Finally, an apparently normal-looking bladder mucosa may contain eggs [see later]; only vesical biopsy, or post-mortem digestion, will then reveal them there.

Part II deals with the changes which may occur in the ureter; the prognosis of the condition is closely dependent on these. Ureteral changes may be resultant on the bladder changes as already indicated; or they may be due to direct primary involvement of the ureteral wall. In this latter case fibrous tissue replacement of muscle leads to dilatation, or to stenosis, or to both. When the ureter is directly involved there usually is also an extensive bladder involvement; so there are secondary ureteral changes as well as primary. Ova can be found in all layers of the ureteral wall; the resultant lesions may resemble those seen in the bladder: but fibrosis is the most characteristic ureteral change. The

lower third is that part most involved, probably because of the extensive anastomosis which exists between the mesenteric veins and those in the base of the bladder, prostate and lower ureters. At the level of the 3rd and 4th vertebrae there is anastomosis between the superior mesenteric and right ureteric veins, and the inferior mesenteric and left ureteric veins; so here also is a site prone, though rather less so, to primary involvement.

As a result of these primary and secondary ureteral involvements the ureters cannot effectively expel urine into the bladder, so dilatation and distortion occur. Initial compensatory hypertrophy of the uninvolved upper ureter is followed by its dilatation; this extends to the pelvis and the calices with hydronephrosis.

Calculus formation in urologically complicated schistosomiasis is very unusual; secondary infection of the bladder also is surprisingly rare. Though carcinomatous change in the bladder has not been encountered in Europeans by the authors, bladder carcinoma is the commonest form of malignant disease in Africans; usually it is associated with schistosomiasis—but whether the latter is really the cause is not entirely clear though the comparatively young age-group involved suggests that it is. The real tragedy of schistosomiasis in the African is that it is a disease affecting young people.

Part III is concerned with symptomatology; this can better be determined in the European than in the African—whose account of his trouble is often unreliable. Haematuria, sometimes but not always terminal, is usually the first sign and it may be associated with hypogastric discomfort, frequency and penile pain on micturition. Ova are usually to be found in the urine at this time together with red cells and albumin. Physical exercise or a concomitant fever increase the amounts of these; but the taking of drugs (*e.g.* sulphonamides) may cause them temporarily to disappear. When fibrosis after some years is becoming extensive the grosser urological changes with their associated symptoms become evident. There are now considerable differences in the symptoms suffered by European and those by African patients. In the African the disease is more extensive as he is the more often exposed to reinfection, and this is reflected by his symptoms. On detailed examination he is found to have all types of lesions; in the European, on the other hand, the presence of the infection as a rule has been detected some years earlier and he has been adequately treated for it; he suffers only late fibrotic lesions as he has not been reinfected.

Fibrosis of the bladder causes frequency; this is usually slight in the European but marked in the African; in the latter it may be severe, with nocturnal dribbling incontinence. Associated pain usually means secondary bladder infection; the symptoms then become distressing and are the precursors of uraemia following on renal destruction and pyelonephritis. Africans may have dilated, tortuous and stenosed ureters with but little complaint of pain or of urinary disturbances; of 67 such patients only 36 complained of aches or of colic. In some patients with ureteral fibrosis there may be ureteral colic similar to that caused by a stone, or there may be only a dull ache; but there is no associated haematuria other than any caused by bleeding from the bladder. In the case of ureteral stricture colic is usual, and often it is really severe.

While the seminal vesicles, prostate and adjacent portions of the vas deferens often contain eggs, the rest of the male genital system rarely does so owing to its different blood supply. Haematospermia is sometimes seen in Europeans, but very rarely in the more heavily infected African. Though genital swellings,

hydroceles, funiculitis and other similar disorders are common in Africans in Nyasaland and Northern Rhodesia, these are especially prevalent in *Wuchereria bancrofti* areas; biopsies have failed to substantiate statements made in other parts of the continent that they are due to schistosomiasis.

In Part IV the cystoscopic appearances of urinary schistosomiasis in the 300 Europeans and 100 Africans are described in some detail. Some of these patients have been re-cystoscoped at intervals for up to 10 years. The earliest visible lesion is the schistosomal tubercle; this initially is pink and fleshy, and is surrounded by faint congestion. These tubercles may disappear; or they later become pale and fibrotic; eventually they calcify and become shining white dots in a raised mucosa. The next most common change is pallor and haziness of the mucosa due to fibrosis with loss of its vascularity; in the latest stage the mucosa looks like washed pigskin. Sandy patches are very common in the advanced stage and these areas are pathognomonic; their greatest frequency is on the base but they may extend to any part of the bladder. Areas of granulation, due to loss of epithelium over the sandy patches, with papilloma formation, pedunculation and calcification are also common in the African bladders.

Possible changes in the ureteric orifices, as might be expected, are numerous; often they are displaced, usually backwards and towards each other.

Systematic cystoscopic biopsies on 79 Europeans and 21 Africans showed that normal looking mucosa only rarely yields eggs; tubercles and sandy patches always did so. On one occasion an adult worm was found on biopsy of a doubtful tubercle. In general, vesical biopsy is of limited value in diagnosis as a negative biopsy is not significant. Fibrosis of the bladder neck, reported to occur in Egypt, was not found as a result of urinary schistosomiasis.

In Part V are described in detail the urological findings and the techniques employed in arriving at them. These should be consulted in the original by those undertaking such investigations. Of the 300 Europeans studied 94 (31%) had ureteral strictures, and of the 100 Africans 42 (42%). There are excellent radiographs illustrating these and other lesions. 53 kidneys in 42 Europeans (14%) were hydronephrotic; among the 58 African patients with hydronephrosis 100 kidneys were so affected. It is again emphasized that ureteral dilatation, involving the kidney pelves and calices, may be marked without any ureteral stenosis and that this is due to bladder back-pressure and contributed to by distortion of the ureteral orifices allowing reflux—this was seen in 22 of the Africans. Reflux in the absence of intravesical pressure is compatible with good health.

Ureteral stenosis cannot always be attributed to schistosomiasis in this part of the world; the pathology and the appearances of urinary tuberculosis are very similar, though the latter is an infrequent disease.

Part VI covers the treatment of urinary derangements due to schistosomiasis, and ends with a summary of the whole paper. Dilatation of ureteral strictures is rarely of permanent benefit; some form of incision or excision should be employed to relieve firm fibrous strictures, according to their site, with or without reimplantation of the ureters. Nephrectomy may be necessary when there is pyogenic infection of a kindey or other massive damage to it. Ileocystoplasty may become advisable as the bladder becomes contracted [*ibid.*, 1956, v. 53, 774], and if there is also ureteral stenosis ileal implantation of the ureters is necessary. The mortality following these procedures in the authors' hands has been low (1 death in 25 operations), and the single example was the result

of intestinal obstruction caused by a haematoma (the patient refused a relief operation).

[This excellent, well illustrated monograph very admirably covers most aspects of the problem. It should prove of the greatest value to those charged with the surgical relief of complicated urinary schistosomiasis.] *A. R. D. Adams*

EL MAHALLAWI, M. N. **The Effect of Local Hyaluronidase Instillation in Calcified Bilharzial Bladder. (A Preliminary Report.)** *J. Egyptian Med. Ass.* 1960, v. 43, No. 4, 240–42.

"Hyaluronidase, by local instillation, was used for the first time for bilharzial calcification of bladder. Trial in three cases showed definite improvement of frequency although the radiological manifestations did not show any change."

ANDERSON, R. I. **Serologic Diagnosis of *Schistosoma mansoni* Infections. I. Development of a Cercarial Antigen Slide Flocculation Test.** *Amer. J. Trop. Med. & Hyg.* 1960, May, v. 9, No. 3, 299–303. [14 refs.]

The author, realizing the need for a simple serological test for the recognition of *Schistosoma mansoni* infections, experimented with two previously described flocculation tests [BRANDT and FINCH, *Amer., J. Clin Path.*, 1946, v. 10, 141; also WRIGHT *et al.*, this *Bulletin*, 1947, v. 44, 833]. Having failed to obtain "satisfactory reproducible results" with either method, he devised the technique described in the present paper.

The actual test appears to be well suited for field and survey purposes, since it is simple to perform and can be carried out rapidly with a minimum of apparatus; while if the cross-reactions common to all previously described tests are excluded, the results shown suggest a high degree of sensitivity. On the other hand, the preparation of the essential cercarial antigen is by no means simple, and those interested must consult the original for the necessary details. *R. M. Gordon*

HUANG, Lan-Sun. [**Chemistry of Cercaricidal Agents of *Schistosoma japonicum*. I. The Relation between the Chemical Constitution and Cercaricidal Activity of Several Groups of Esters, Amides and Chlorinated Phenols**] *Acta Pharmaceutica Sinica.* 1960, June, v. 8, No. 6, 255–64. [11 refs.] [In Chinese.]

The English summary appended to the paper is as follows:—

"This paper discusses the relation between the constitution of different chemicals and their cercaricidal activity. The tested chemicals are chlorinated phenols, benzoic esters, substituted benzoic esters, halogenated acetic esters, thiocyanated acetic esters, 2-furan carboxylic esters, lauric esters, ω-undecylenic esters, and different amides. It has been found that the cercaricidal activity is influenced by the following:

"(1) Substitution on the methyl carbon of the acetic esters with halogen, thiocyanogen or phenoxy group increases the activity.

"(2) The increase of the number of carbon atoms of the aliphatic acid part of the esters seems to be beneficial to the activity.

"(3) By increasing the substitution of halogen on the phenol ring, the activity is enhanced.

"(4) Changing of the amides to esters results in increasing activity.

"(5) By introducing diethylamino group into the β-position of the ethyl group of the ethyl esters, the activity is increased.

"The last one has the most pronounced effect, for example, B-diethylaminoethyl laurate is effective at 1:100,000,000 dilution, which is nearly 1,000 times more effective than the bis-(2-hydroxy-3,5,6-trichloro-phenyl)-methane(hexachlorophene)."

KOMIYA, Y., SUZUKI, N., KUMADA, M., FUKUSHIMA, T. & KOZAI, I. **[On the Distribution of *Clonorchis sinensis* around the Lake Biwa Areas, Shiga Prefecture]** *Japanese J. Parasit.* 1960, Apr., v. 9, No. 2, 162–6, 1 map. [10 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"In Winter of 1958 and 1959, the authors made researches on the distribution of *Clonorchis sinensis* around the Lake Biwa areas, Shiga Prefecture. The results obtained were summarized as follows:

"1) The metacercariae of *Clonorchis sinensis* were found to be harbored in fishes. 5 species were as follows: *Rhodeus ocellatus, Gnathopogen elongatus elongatus, Sarcocheilichthys variegatus, Pseudorasbora parva, Triboldon hakonensis.*

"2) Of the 4,021 stool examinations secured, 535 (13.3% : 2.5–54.2%) were positive for clonorchis egg.

"3) The incidence of the infection among the inhabitants on the eastern regions of the lake was higher than that among those on the southern and western regions of the lake and that among those along the lake side was found particularly high.

"4) Several factors which conditioned the clonorchis infection were also discussed."

TAKANO, S. **[Studies on Immunological Diagnosis of Paragonimiasis]** *Japanese J. Parasit.* 1960, June, v. 9, No. 3, 246–65, 9 charts. [26 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"The survey for paragonimiasis with the intradermal test, complement fixation test (C.F.-test) and the rapid flocculation test (R.F.-test) were held in the endemic areas, Shizuoka-, Niigata-, Ehime-, Kochi- and Miyazaki-prefectures in Japan. The new technique of R.F.-test with the cholesterol-lecithin antigen (C-L-antigen) which was described by Vogel (1957) as the diagnosis for trichinosis was applied for paragonimiasis in parallel with the other tests. The results were summarized as follows:

" 1. The eggs of paragonimus were proved by stool and sputum examinations in 187 cases (25.4%) out of 737 cases which showed positive intradermal test, and in 9 cases (3.9%) out of 233 cases which showed doubtful intradermal test respectively.

" 2. Paragonimus eggs were shown respectively in 159 cases (49.1%) out of 386 C.F.-test positive cases and in 37 cases (6.3%) out of 584 C.F.-test negative cases.

" 3. No correlation was found between the egg positive ratio and the increase of diameter of wheals of intradermal test. But a high correlation was seen between the egg positive ratio and the antibody titers of C.F.-test ; 32.0% of 120 cases of × 10 to × 50 in dilution of serum, 54.1% of 74 cases of × 50 to × 150 and 65.5% of 29 cases of × 150 were proved to be paragonimiasis (less × 10: negative reaction).

" 4. The R.F.-test and the C.F.-test seemed to be equally sensitive.

" 5. 84.6% of 52 sera of paragonimiasis patients were shown as positive by R.F.-test with bentonite antigen (B-antigen) and 65.4% of those positive with C-L-antigen. False positive reactions were shown in 12.7% of 63 control sera with the former test, and only in 6.4% of them with the latter test.

" 6. Both of the titers of C.F.-test and R.F.-test decreased gradually in the course of treatment of 15 paragonimiasis patients, and became finally negative during the periods from 1 to 3 months after the beginning of successful treatment.

" 7. Comparisons of the results of the above mentioned tests were made on the following items (a-c):

" a) Sensitivity of the tests—R.F.-test with B-antigen $\geq$ C.F.-test>R.F.-test with C-L-antigen.

" b) Recovering rate of eggs—R.F.-test with C-L-antigen>R.F.-test with B-antigen>C.F.-test.

" c) Rate of false positive reaction—C.F.-test with B-antigen>R.F.-test with C-L-antigen."

EIKAS, J. & KIM, P. K. **Clinical Investigation of Paragonimiasis.** *Acta Tuberculosea Scandinavica.* 1960, v. 39, No. 2, 140–47.

DUK JIN YUN. **Paragonimiasis in Children in Korea. Related to the Custom of Ingesting Raw Crayfish for the Treatment of Measles.** *J. Pediatrics.* St. Louis. 1960, June, v. 56, No. 6, 736–51, 7 figs. [30 refs.]

After referring to pulmonary eosinophilia as it occurs in infants and young children and as a cause of ill-health, the main purposes of this paper is to summarize clinical observations of 8 children in Korea whose symptoms were strikingly similar to those of visceral larva migrans, but who were reported to have paragonimiasis resulting from the ingestion of raw crayfish for the treatment of measles.

The ages of these patients varied from 2 years and 10 months to 11 years and 3 months, and all were males. The onset of the disease was insidious and became evident with slight cough and mild fever which led to a provisional diagnosis of pulmonary tuberculosis. 3 children had marked hepatomegaly

with varying ascites ; 7 had pleural effusions and one had a massive empyema ; one had pericardial effusion and 2 general anasarca. Enlargement of the spleen was evident in one: 2 had migrating nodules, most of which disappeared spontaneously within 1–2 months. In one special case masses appeared in the abdominal cavity, the subcutaneous tissues of the sole of the right foot, scalp, abdominal wall, and right retro-orbital region giving rise to exophthalmos and haemorrhage of the retina and eventually to Jacksonian fits.

All these children had been treated previously with juice expressed from crayfish by squeezing and mashing them, especially one species *Astacus similis*, as a cure for measles.

In every case blood counts showed marked leucocytosis and an eosinophilia ranging from 11 to 52%, with a mean of 35. Body fluids showed an even higher eosinophilia of 85 to 90%. A mild to marked increase in the globulin fraction of the serum protein was almost constant and the total protein might be normal or increased. The albumin-globulin ratio was usually reversed, because of gamma globulin increase, without decrease in the albumin. Liver function was not impaired. Aspiration of the bone marrow in 2 severely ill children showed eosinophilic hyperplasia, of which 70% of the eosinophiles were mature. Intradermal tests were positive in all and the eggs of *Paragonimus westermani* were demonstrated in 4 cases—3 of them from the sputum and one from the pus of a brain cyst.

The clinical course is usually chronic and benign and the prognosis good, except in cerebral paragonimiasis which may lead to mental retardation, blindness and motor disturbances. Paragonimiasis is one of the most important health problems in Korea.

Attention is drawn to the similarity between the symptoms of visceral larva migrans due to *Ascaris lumbricoides* or *Toxocara canis* and paragonimiasis in children.

The results are set out in several tables and figures and discussed fully.

Philip Manson-Bahr

OMURA, H. **[Studies on Host-Parasite Relationship of the Lung Flukes. Experiments of Transplantation of Adults *Paragonimus ohirai* and *P. westermani* into Peritoneal Cavities of the Subcutaneous Tissues of Rats.]** *Japanese J. Parasit.* 1960, June, v. 9, No. 3, 266–80, 3 figs. [18 refs.] [In Japanese.] English summary.

ROWCLIFFE, S. A. & OLLERENSHAW, C. B. **Observations on the Bionomics of the Egg of *Fasciola hepatica*.** *Ann. Trop. Med. & Parasit.* 1960, June, v. 54, No. 2, 172–81, 5 figs.

"The observations reported here show that three factors are critical to the hatching of the fluke egg: it must become separated from faeces ; there must be an adequate temperature for development ; and throughout the entire period from deposition of the egg in faeces to the hatching of the miracidium, the egg must be surrounded by a surface film of moisture if it is not to die of desiccation."

Eggs in faeces did not hatch under a variety of conditions and only a few underwent development even in the most favourable circumstances. Their viability in faeces varied from 3 weeks to several months, being longer in winter and shorter in summer.

Eggs free from faeces developed according to temperature, the critical figure being 9·5°C± which is high enough to restrict development in Great Britain to the period May to October. Development of miracidia took at least 3 weeks under observation but in the field this period may be longer; hence the risk of death by desiccation is increased, for a film of moisture was found to be essential at all times.

"The two most important factors influencing development . . . are therefore usually antagonistic—temperature limiting development in winter and moisture in summer. Periods of wet weather of sufficient duration to allow full development of the egg may, however, occur during the summer, and it is then that miracidia will be produced."

Inasmuch as moisture is such an important factor in the liberation of eggs from faeces, and for their development and hatching, the most favourable areas in this respect will lie between permanent water and well drained land, which also provide the most likely habitats for *Lymnaea truncatula*.

J. J. C. Buckley

YAMAGUTI, S. **Systema Helminthum. Vol. I. The Digenetic Trematodes of Vertebrates—Parts I and II. Vol. II. The Cestodes of Vertebrates.**

This book was reviewed on p. 971.

MYERS, N. A. **Hydatid Disease in a Children's Hospital.** *Med. J. Australia.* 1960, May 21, v. 1, No. 21, 806–8.

The main purpose of this paper is to present the clinical features of hydatid disease as observed among 72 children admitted to the Royal Children's Hospital, Melbourne, from 1938 onwards. The author points out that the total time spent in hospital by these 72 patients amounted to 5,370 days, that the estimated cost was £12,000 and that 4 deaths occurred, all within the first half of the 20-year period. To prevent a perpetuation of this situation he recommends stricter public health measures, primarily aimed at preventing infestations of dogs.

The summary is as follows:—

"1. The clinical features, distribution, presenting symptoms and results of investigations of 72 cases of hydatid disease in children are discussed.

"2. In this series boys predominate over girls, and the majority were aged between three and 10 years.

"3. The relatively high incidence of pulmonary involvement is contrasted with the situation in adults, in whom hepatic cysts are observed more frequently.

"4. Serological investigation is important, but negative results do not exclude the diagnosis.

"5. Stricter public health measures are necessary in order to eradicate the disease."

[This well documented paper does not lend itself to further summarization and should be read in the original by those interested.] *R. M. Gordon*

Perez Del Castillo, C. Inmuno biologia de la equinococcis. [**Immunobiology of *Echinococcus* Infection**] 71 pp. [204 refs.] English summary. 1960. Montevideo: Solano Antuna 2908, Uruguay.

In this monograph the author deals at length, both from his own studies and from an extensive review of the literature, with the complicated subject of immunobiology in relation to echinococcal infection.

The monograph is divided into 5 chapters, dealing respectively with general aspects of the antigen-antibody reaction, with the differences in this respect between bacteria and parasites, with immunobiology specifically related to echinococcal infection, with new methods for desensitization and immunization and finally with brief conclusions.

The author's main thesis is concerned with the multiplicity of echinococcal antigens and he believes that the unitary theory has given rise to much confusion. Thus diagnostic tests are not specific and only indicate that a patient had been parasitized but, because of cross-reactions within the antigen mosaic, the species cannot properly be identified.

There is a need to identify the separate antigen components of the echinococcus complex more fully. Until this is done, biological therapy will give conflicting results.

The author believes that in our present state of knowledge one cannot speak of an "anti-hydatid-cyst" vaccine nor of an "anti-*Taenia* vaccine", since clinically it is only possible to produce a preventive anti-scolex action.

H. J. O'D. Burke-Gaffney

Garabedian, G. A., Matossian, R. M. & Djanian, Aida V. **Serologic Diagnosis of Hydatid Disease by Indirect Hemagglutination.** Reprinted from *Lebanese Med. J.* 1957, July, v. 10, 275–82.

An indirect haemagglutination test for hydatid disease is done by treating human Group O, Rh negative erythrocytes with a 1 in 20,000 dilution of tannic acid and, after sensitizing them with hydatid fluid, testing their agglutination by specific immune serum.

The authors have already reported results with 50 sera [this *Bulletin*, 1957, v. 54, 1335]. As a result of further study the test has been improved, standardized and used as a routine technique. In this paper, technique is described in great detail and difficulties are analysed and discussed.

W. E. Kershaw

Garabedian, G. A., Malakian, A. H. & Matossian, R. M. **A Simple Haemagglutination Drop Test for Human Hydatidosis.** *Ann. Trop. Med. & Parasit.* 1960, June, v. 54, No. 2, 233–5.

In a series of previous papers [this *Bulletin*, 1957, v. 54, 1335 and 1959, v. 56, 856] the authors and their colleagues have described an indirect agglutination

test for the detection of specific antibodies in sera taken from patients suspected of hydatid disease. This technique gives excellent results but its application as a screening procedure in studies of large population groups is difficult since it involves the preparation of serial dilutions and the employment of much

TABLE

Comparing the results of the drop method and the dilution method of indirect haemagglutination in 49 patients with hydatid disease and in 100 patients with miscellaneous conditions other than hydatid disease

Patients	No. of cases	Drop method						Dilution method					
		Positive		Doubtful		Negative		Positive		Doubtful		Negative	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Hydatid disease	49	43	87·75	1*	2·05	5†	10·20	44	89·79	—	—	5†	10·21
Other disease	100	—	—	—	—	100	100	—	—	—	—	100	100

* Had a titre of 1:40 by the dilution method.
† Gave negative results by both methods.

equipment. The authors therefore devised the much simpler drop technique described in the present paper. This simplified test, as is shown in the Table above, gives almost as accurate results as the more complicated dilution technique previously recorded. *R. M. Gordon*

KAGAN, I. G., NORMAN, Lois, ALLAIN, Dorothy S. & GOODCHILD, C. G. **Studies on Echinococcosis: Nonspecific Serologic Reactions of Hydatid-Fluid Antigen with Serum of Patients Ill with Diseases other than Echinococcosis.** *J. Immunology*. 1960, June, v. 84, No. 6, 635–40. [17 refs.]

"Sera from 129 patients ill with liver cirrhosis, nephrosis, lupus erythematosus, multiple myeloma and diseases other than echinococcosis were tested with the haemagglutination test and flocculation tests. In the entire sample nine sera (7%) were positive by haemagglutination and 11 sera (8·5%) by flocculation; however, 36 of 129 (28%) showed some degree of serologic reactivity. In the cirrhosis sample, 19 of 35 sera (49%) were serologically reactive and in the other diseases from 10–25% of the sera showed reactivity." [These statements should not be taken as implying that so high a proportion of the sera obtained from patients free from infection with *Echinococcus* gave false positive reactions. Elsewhere in the paper the authors state that only 3 (2·5%) of these sera were positive with both haemagglutination and flocculation tests, and only 2 (1·5%) gave haemagglutination titres greater than 1 in 200; whereas with sera from 55 persons known to harbour *Echinococcus* the lowest titre recorded was 1 in 400.] "Analysis of some of the sera by paper electrophoresis showed no correlation between A/G ratios and reactive and negative sera.

"Analysis of *Echinococcus granulosus* antigens of porcine origin and *E. multilocularis* antigens from cotton rats revealed the presence of host protein in these antigens. Studies by agar double diffusion methods revealed that *E.*

granulosus and *E. multilocularis* antigens have common antigens with host liver.

"Serologic activity with echinococcus antigens in patients with liver disease is believed to be due to the presence of autoantibodies which cross-react with host protein in the hydatid fluid antigen." *R. M. Gordon*

DOBREV, J. **Complicated Pulmonary Echinococcus as a Cause for the Development of Lung Cancer.** *Folia Med.* Plovdiv. 1960, v. 2, No. 1, 33–8, 4 figs.

A discussion based on a description of two cases in Bulgaria.

GIRDWOOD, W. **Abdominal Hydatids. Two Unusual Cases.** *Med. Proc.* Johannesburg. 1960, Aug. 13, v. 6, No. 16, 361–6, 5 figs. [16 refs.]

"Two unusual cases of Echinococcal cysts of the abdomen are described, the first presenting as an acute abdomen from rupture of a cyst.

"The methods of dealing with these irremovable cysts are described. One was treated per rectum.

"A case of hydatids causing acute cholecystitis and stenosis of the sphincter of Oddi, is also recorded."

ROCHE, M. & MARTÍNEZ TORRES, C. **A Method for *in vitro* Study of Hookworm Activity.** *Exper. Parasit.* New York. 1960, June, v. 9, No. 3, 250–56, 6 figs.

PEREIRA LIMA, J., PALOMBINI, B. C. & TANNHAUSER, Semíramis L. A ditiazanina no tratamento de estrongiloidíase. [**Dithiazanine in the Treatment of Strongyloidiasis**] *Rev. Brasileira Med.* Rio de Janeiro. 1960, Feb., v. 17, No. 2, 123–6. [28 refs.]

The English summary appended to the paper is as follows:—

"The authors made a review of the literature concerning the treatment of Strongyloidiasis. The conclusion achieved was that thus far there is no adequate treatment for this worm. Dithiazanine was studied in 17 patients with Strongyloides stercoralis. The dosage used was 300 mg in the first 2 days and 600 mg in the following, up to the 15th day. The parasitologic diagnosis, as well as the control fecal examinations were made using Baermann's technique. Three control examinations were made, and carried out in a variable period from 4 days to 3 months, but having 6 to 8 days in average. The cure rate was of 92.3%. In 1 patient a second course of Dithiazanine increased the cure rate to 98.2%. Anorexia, nausea, vomiting, abdominal cramps, and diarrhea were observed. In only one patient these symptoms were high enough to interrupt the administration of Dithiazanine."

ANAND, B. R. **Ascariasis. A Case Report of a Family showing Heavy Infestation of all the Members.** *Indian Practitioner.* 1959, Aug., v. 12, No. 8, 763–7.

COORAY, G. H. & PANABOKKE, R. G. **Granulomatous Peritonitis caused by *Ascaris* Ova.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1960, July, v. 54, No. 4, 358–61, 5 figs. on pl. [12 refs.]

"1) The literature on granulomatous lesions in the human peritoneum resulting from the entry of *Ascaris lumbricoides* ova has been reviewed.

"2) Lesions have been produced in the rat omentum by the introduction of ascaris ova into the peritoneal cavity, and their evolution has been described.

"3) The ova alone have been responsible for such lesions in the experimental animal.

"4) In the diagnosis of granulomatous peritonitis in tropical countries the possibility of an ascaris infection has to be borne in mind."

SCHIAPPACASSE F., E., WILHELM G., O. & LAGOS C., J. Tratamiento de la ascaridiasis del adulto con hexylresorcinol y derivados de la piperazina. **[Treatment of Ascariasis in Adults with Hexylresorcinol and Piperazine Derivatives]** *G.E.N.* Caracas. 1960, Jan.–Mar., v. 14, No. 3, 279–90. [17 refs.]

The incidence of ascariasis in Chile is high and in a survey in the lake zone SILVA *et al.* [this *Bulletin*, 1954, v. 51, 1274] reported an incidence of 56·6%. which they stated to be one of the highest reported in the world literature. They also noted 47·3% of infections in persons aged 31 years or more, and since reports on treatment are commonly concerned with children the present authors (from the parasitology department of the University of Concepción) have made this study of comparative treatments in adults.

90 patients aged 14 to 65 years with proved *Ascaris* infection were treated, and treatment was followed up with stool examinations on the 7th–9th day thereafter. A saline purge was given on the day after the end of treatment.

30 patients received piperazine adipate in the form of tablets (300 mgm. each) at a dose of 80 mgm./kgm. [shown in the text as 30 mgm./kgm.] daily for 5 days and 30 received 50 mgm./kgm. daily for the same period, given in 4 divided doses without dietetic restriction. 30 patients received hexylresorcinol, in a total dose of 1 gm.; 5 successive capsules of 0·2 gm. each were given to fasting patients, whose diet had been appropriately restricted.

Tables give details of each patient, individual doses, results of stool examinations, percentage of cures, days on which worms were expelled and side effects.

From these it is apparent that 29 of 30 patients had negative stools after the higher dosage of piperazine and 24 of 30 after the lower dosage. The individual daily doses in these 2 groups varied respectively from 3 to 6 gm. and from 1·6 to 3·9 gm. In the group receiving the higher dose, 13 patients expelled *Ascaris* on the second day, and of those on the lower dose, 18 expelled them on the third or fourth days. Only 20 of 30 patients receiving hexylresorcinol were cured.

Half of the 30 patients on the higher dose of piperazine, but only one-third of those on the lower, showed side effects, mostly light gastro-intestinal disturbance of short duration and not involving interruption of treatment.

There was not a striking difference between the results obtained with the two regimes of piperazine but these were clearly superior to those obtained with hexylresorcinol and the higher dosage was slightly the better of the two [in the authors' summary, the higher percentage of successes (96·7%) is attributed to the lower dose: this is no doubt a misprint]. *H. J. O'D Burke-Gaffney*.

ASAMI, K., KAWAZOE, Y., KOMETANI, K. & HITOSUGI, M. **[Experimental Evaluation of Ascaricidal Effects of Domoic Acid extracted from a Sea Weed Hanayanagi]** *Japanese J. Parasit.* 1960, June, v. 9, No. 3, 290–93. [In Japanese.]

The English summary appended to the paper is as follows:—

"Domoic acid is a new anthelmintic which was extracted by Takemoto in 1959 from a kind of sea weed Hanayanagi, *Chondria armata* (Kützung) Okamura. This is a colorless and odorless crystal having slightly sour taste.

"The present paper deals with the experimental evaluation of the ascaricidal effects of domoic acid.

"People infested with ascaris were checked after the examinations of two direct smears of their stools. They were then given the drug in a single dose when they were hungry, usually before breakfast. Two weeks after the administration of the drug, their stool specimens were examined again in the same method as stated above to evaluate the effect of the drug.

"In 25 cases which were administered 5 mg of domoic acid, 13 revealed no ascaris eggs by the examination made two weeks later. In the cases of administration of 10 mg, no ascaris eggs were found from 21 cases out of 31. In the cases of 20 mg administration, the eggs could not be found in 17 out of 31. Combined administration of 10 to 20 mg of domoic acid with 50 mg of santonin did not shift the rate of complete removal compared with the rate of single administration of domoic acid. No side effects were recognized even in the cases administered 40 mg of the drug.

"Single administration of domoic acid is more effective in removal of ascaris than that of santonin or kainic acid which was extracted from a sea weed, *Digenea simplex*."

ENIGK, K. & ECKERT, J. Die Desinfektion von Tierausläufen. **[Disinfection of Animal Discharges]** *Zent. f. Bakt.* I. Abt. Orig. 1960, v. 179, No. 3, 397–432, 3 figs. [Numerous refs.]

This is a long and detailed paper with very many references in which there are descriptions of methods for destroying disease-producing organisms, particularly helminth ova, which may have reached the soil from animal sources. The different types of these helminths are stated with description of published experience on their varying resistance to different chemical disinfectants and physical conditions.

Experiments undertaken by the authors showed that helminth eggs may penetrate, according to circumstances, for a distance of about 4 cm. into the

soil although the majority remain in the surface embedded in particles of faeces. The eggs are only partly destroyed by the application of the usual disinfectants in watery solution. Sodium pentachlorphenolate (30 gm. in 3 litres of water per square metre) was found to be relatively good as it completely destroyed free-lying *Ascaris* eggs to a depth of 1 cm. Further investigations were made with a number of gaseous disinfectants and these were found to penetrate more effectively into the soil, provided the surface is covered with a gas-proof material and the soil is not too moist or too tightly packed and at a temperature of over 10°C. The most effective gaseous agent was 1,2-dibromethane which in an application of 100–200 ml. per sq. m. destroyed all *Ascaris* eggs to a depth of 20 cm. at a temperature of 20°C. Methyl bromide was found not to be so reliable and the other gases mentioned were also less effective.

Drying quickly kills the ova of roundworms, flaming has only a surface effect but a method of steaming which is described in detail was found to give very satisfactory results. *M. E. Delafield*

CHOWDHURY, A. B., KEAN, B. H. & BROWNE, H. G. **Inoculation of Helminth Eggs into Animal Eyes.** *Amer. J. Path.* 1960, June, v. 36, No. 6, 725–33, 5 figs. on 3 pls.

The authors state that "In cases of helminthic ophthalmitis, mechanical trauma due to active migration of the parasite contributes substantially to the lesions encountered". On the other hand they consider that it is more difficult to define the nature of the host's response to the passive presence of a parasite. In order to throw light on the latter problem, and also because they wanted to know if the intraocular environment would support the growth of helminth ova, they introduced the eggs of *Ascaris lumbricoides* var. *suum* into the eyes of rabbits and guineapigs.

In some instances the eggs were introduced into the anterior chamber of an otherwise undamaged eye while the lens of the other eye was deliberately traumatized before the eggs were injected; in other instances the eggs were injected into the vitreous body. In some of the experiments the eggs were incubated at room temperature for 2 weeks before being injected, while in other experiments they were injected without previous incubation. All the operations were conducted with aseptic precautions; the eggs (obtained from the uteri of the worms) were stored in 0·5% formalin and, after washing, were suspended in an antibiotic prior to injection.

The authors' summary is as follows:—

"Live eggs of *Ascaris lumbricoides* var. *suum* were introduced into the anterior chamber of guinea pig and rabbit eyes. These could be detected in histologic sections with a greater frequency when the lens was injured during inoculation. No recognizable tissue alteration was observed up to 2 weeks following inoculation.

"Up to one week after inoculation into the vitreous body, no appreciable tissue response was evident, and the eggs remained within the chamber. Two weeks after the inoculation, no ova were detected in this region, but there was a manifest host reaction, characterized by a marked eosinophil response in the vitreous and an eosinophilic choroiditis. Specimens of eyes in which some of the periocular tissues had been inadvertently included revealed the eggs outside

the eyes. Here they were surrounded by an intense eosinophilic granulomatous reaction.

"No growth or development was observed in the inoculated ova (irrespective of time of examination and area of lodgment). Some of them were found to be dead or dying." *R. M. Gordon*

PETTER, C. Etude zoologique de la *Larva migrans*. [**Zoological Study of *Larva migrans***] *Ann. Parasit. Humaine et Comparée*. 1960, v. 35, Nos. 1/2, 118–37. [43 refs.]

The following is a free rendering of the author's conclusions.

As a result of studies of worms in the *Ascaris* group, it is now known that the heteroxenous ascarids very often utilize intermediate hosts for the development of their larvae; it is also known that these intermediate hosts, unlike the definitive host, are by no means specific. In addition, it has been observed that the travels of the larvae in the intermediate host, when these correspond with an active stage of metabolism, are always associated with clinical signs.

It is easy to trace the connexion between these facts and what is observed to happen in clinical cases. In the majority of such instances it is the relatively common ascarids of the dog and cat which, when developing in man as their intermediate host, produce these manifestations. Meanwhile it is interesting to note that *Lagochilascaris minor*, normally a parasite of wild felines, has been recovered on several occasions from a human host.

These findings suggest that man often becomes infected by the accidental ingestion of the eggs of ascarids occurring in wild animals.

In this connexion the author has compiled a list of those snakes, birds and mammals which occur in France and which, because of their numbers and close association with man, may, by means of their excretions, transmit their intestinal parasites to the human hosts.

[This paper, which does not appear to contain any original observations, is a comprehensive review of a subject which has recently become of more than academic importance.] *R. M. Gordon*

LENTH, V. T. J. **Cutaneous Filarial Infection in Human Beings.** *J. Amer. Med. Ass.* 1960, July 9, v. 173, No. 10, 1124.

An immature female filaria of *Dirofilaria conjunctivae* [possibly *D. immitis* occurring in an abnormal host] has been recovered from a lesion on the chest of a woman aged 65 in Illinois, who had been living in Florida for 4 years.

5 similar cases have previously been described from the United States [this *Bulletin*, 1957, v. 54, 854; 1959, v. 56, 1266]. *W. E. Kershaw*

BROWNE, S. G. **Onchocercal Depigmentation.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1960, July, v. 54, No. 4, 325–34, 7 figs. [3 (1 coloured) on 2 pls.] [Numerous refs.]

The onchocercal depigmentation here referred to is seen only in persons with long-standing onchocerciasis with its associated stigmata—sclerosing hypertrophic inguino-crural lymphadenopathy, severe onchodermatitis and, in the

most advanced cases, posterior segment lesions in the eye. It was studied in the population of the tropical rain-forest in the Oriental Province of the Belgian Congo, on either side of the Congo River which is fed by numerous fast-flowing streams; its origin was suggested on epidemiological grounds. The local inhabitants themselves distinguish onchocercal depigmentation from that due for example to treponematosis (yaws), and they associate it with black-flies and xerodermic pruritus.

Clinical examination, with 2 skin snips, of some 45,000 patients showed 31·41% (4,633) of the men, 21·19% (2,597) of the women and 3·06% (551) of the children to harbour onchocercal infections; with more skin snips from each patient doubtless the figures would have been higher. Of those with known infection 6·2% (286) of the men, 1·2% (30) of the women, and 0·2% (1) of the children had onchocercal depigmentation. This depigmentation was seen almost exclusively in hyperendemic foci of the infection; its incidence was not related to age *per se* but to duration of stay in the hyperendemic foci. It was never seen in areas free from onchocerciasis. Dissection of *Simulium* caught in one of these foci showed 5% of them to harbour larvae of *Onchocerca volvulus*; 6% of these were mature infective forms. 95% of *Simulium* bites were situated on legs and trunk, within 80 cm. of the ground; the proportion of onchocercomata below the waist was the same; only 0·1% was found on the scalp.

Areas of onchocercal depigmentation occur only on certain parts of the body; the great majority (470 out of 549) are on one or the other, or both, pretibial regions; far fewer are located in the groins, over Scarpa's triangle, or over the iliac spines; very few indeed (4 out of 549) were found on the chest. In the most advanced cases the areas were large and included the pretibial and crural regions, the adjacent abdomen and even the skin near the axilla. In this province of the Congo, in addition to onchocercal depigmentation, treponemal depigmentation was present on other sites on the bodies of some of the same patients.

The progress of the onchocercal depigmentation is of variable duration; it is punctate at first; it then becomes stippled ("*peau léopardée*") and patchy; the patches coalesce as they steadily become more extensive. The skin over the middle third of the tibia is that usually first affected by achromia. In Scarpa's triangle pruritic changes are common; the skin overlying sclerosing hypertrophic inguino-crural glands, which is often also depigmented, becomes atrophic and inelastic and hangs in loose folds ("hanging groin"). Depigmentation also tends to develop where the skin is tense over bony prominences, such as the iliac crests and great trochanters. The achromia due to onchocercal infection is so characteristic that it should not be confused with other forms of skin depigmentation seen in the tropics.

The factors essentially associated with onchocercal depigmentation are long exposure to repeated *Simulium* bites; an appreciable number of easily palpable onchocercomata (5 per person); an onchocercal infection of long duration. Onchocercal dermatitis ("*la gale filarienne*", or "craw-craw") is quite different from onchocercal depigmentation though it is often associated with it; it is a non-specific reaction to chronic pruritus with xerodermia, excoriation, and a scarred lichenified polymorphic eruption on the back, thighs and buttocks. Inguino-crural lymphadenopathy is present in many (90%) of those with onchocercal depigmentation; it does not cause oedema and is not directly

connected with the depigmentation, though its origin is due equally to a heavy worm infection of long standing. 42% of persons with onchocercal depigmentation, for the same reason, have advanced anterior and posterior segment eye lesions.

If all detectable onchocercomata are excised the depigmented areas in one-third of those so treated regain their colour within a year. Biopsies from depigmented areas, taken at various stages, show an initial increase in the number of microfilariae which are located in patchy distribution in them ; later these virtually or absolutely disappear. At first, in addition to some round cell infiltration of the corium (not in immediate relation to parasites) there is a disturbance of the melanoblasts of the germinal layer, especially near coiled microfilariae. Later, hyperkeratosis and some acanthosis develop with disappearance of groups of melanoblasts. Melanin transport by melanophores from the basal to the reticular layer seems to increase, and free pigment can be seen between the papillae. Finally, there is a complete loss of melanin in a thinned epithelium, with fibrosis of the corium and marked increase in elastic and collagen tissue ; the papillary processes vanish and the cells of the germinal layer appear to be undifferentiated.

The available evidence suggests that onchocercal depigmentation is caused by a toxin, probably derived from the larval or the adult worms, which exerts a selective action on vulnerable melanoblasts ; these are located especially in the skin over the shins. *A. R. D. Adams*

MIYAZAKI, I. **On the Genus *Gnathostoma* and Human Gnathostomiasis, with special reference to Japan.** *Exper. Parasit.* New York. 1960, June, v. 9, No. 3, 338–70, 26 figs. [Numerous refs.]

VAJRASTHIRA, S. & HARINASUTA, C. **The Incidence of Enterobiasis among Children at Five Schools and Two Hospitals in Bangkok.** *Ann. Trop. Med. & Parasit.* 1960, June, v. 54, No. 2, 129–31.

The authors, from the Ministry of Public Health, Thailand, and the University of Medical Sciences, Bangkok, have investigated children for the presence of enterobiasis by means of BEAVER's cellulose tape method [this *Bulletin*, 1950, v. 47, 69]. Perianal swabs were taken in the morning. The children came from (a) 3 poor-class schools and 2 middle-class schools and (b) out-patient departments of 2 hospitals: the children were aged 3–12 years. Clinical effects were also studied in 84 children in a hospital who had proved positive for *Enterobius* eggs.

The results are tabulated. 1,708 children were examined and 53·6% were positive. In the schools 59·2% of 1,313 children were positive and in the hospitals 35·2% of 395. There were no sex differences. The higher incidence in schools is accounted for by the closer contact between the children.

These findings are said to be higher than those in India (10%), Malaya (15%), Burma (12%) and Puerto Rico (12–30%) [but no references are given to the sources of these figures].

The incidence of infection was 50·6% at years 3–4 and 60·8% at years 7–8: it then fell to 51·6% at 9–10 and 34·4% at 11–12.

The authors also examined 222 infants aged 1 month to 2 years in the paediatric wards of the hospitals and found 7·2% infected with *Enterobius* eggs.

Symptoms were studied in 84 hospital children. Less than 20% showed symptoms of enterobiasis. The children's parents had seen adult worms in only 10 children. *H. J. O'D. Burke-Gaffney*

MATUDA, S. **Studies on *Enterobius vermicularis* (Linnaeus, 1758) Leach, 1853.** *Med. J. Osaka Univ.* 1960, Mar., v. 10, Nos. 3/4, 521–33, 4 figs. [19 refs.]

The author has experimented with three methods (the Cellophane, the cello-tape and the absorbent cotton techniques) for the diagnosis of *Enterobius vermicularis* infections among children attending a primary school in Hiroshima, Japan. The advantages and disadvantages experienced with each method are described in considerable detail, together with various observations relating to the rates, spread and host-relationships of the infection. *R. M. Gordon*

MINOPRIO, J. L. Brote de triquiniasis humana en Mendoza. **[An Outbreak of Trichinosis in Mendoza, Argentina]** *Semana Med.* 1960, July 4, v. 117, No. 1, 11–14. [19 refs.] English summary (8 lines).

There were 20 cases and 2 deaths.

PHILLIPSON, R. F. & KERSHAW, W. E. **The Production, Deposition and Growth of the Larvae of *Trichinella spiralis*, and their Significance in the Chemotherapy of the Infection. I. Introduction, Summary of Experimental Results, and Discussion.** *Ann. Trop. Med. & Parasit.* 1960, June, v. 54, No. 2, 250–51.

The authors adopt the somewhat unusual, although reasonable, course of first publishing (in the present article) the general results of their investigations and describing their significance in relation to chemotherapy; after which they propose to describe in detail their experiments and their results in a later number of the *Annals*.

Some 800 mice were given standard doses of infective larvae of *Trichinella spiralis*; subsequently the numbers of larvae found deposited in the muscles were counted and certain observations were made on their rate of growth, vitality and capability to infect a new host.

The following results were recorded. Larvae were first recovered from the muscles on the 6th day and their number increased steadily to the 15th day, after which only a few more were found. The authors note that it is difficult to find larvae in the blood stream, probably because they only remain there for a very short period. The rate of larval development is slow and reaches its maximum about the 24th day. On the 17th day the larvae are encysted, resist digestion by pepsin and are infective to new hosts.

As regards the significance of these results in relation to chemotherapy the authors write:

"In mice, any drug intended to reduce the number of larvae deposited must be given before the 15th day, since by that time most of the larvae will have been deposited. In infections in man, the earliest time at which trichinosis can be suspected is 10–14 days after infection, when insomnia and oedema of the face begin to occur. If the infections in mice and in man develop at the same rate, then, in our opinion, the search for a drug to reduce the production of larvae by the female worms is hardly worth pursuing.

"It is questionable whether attempts to kill the larvae already deposited will assist the host, since the most serious clinical manifestations are associated with lesions in the central nervous and cardiovascular systems, and no larvae are found in these tissues, though there is widespread focal necrosis and an intense eosinophilic cellular reaction. It must be assumed that, although larvae are deposited in these tissues by the blood, they do not survive to develop. That the reaction of the host to the parasite, rather than the direct effect of the parasite on the host, is responsible for the clinical manifestations is supported by the markedly beneficial effect of cortisone."

[RITTERSON has suggested that cortisone acts by prolonging the structural integrity of injured cells (see this *Bulletin*, 1960, v. 57, 1202).] *R. M. Gordon*

KAGAN, I. G. **Trichinosis: a Review of Biologic, Serologic and Immunologic Aspects.** *J. Infect. Dis.* 1960, July–Aug., v. 107, No. 1, 65–93. [Numerous refs.]

DEFICIENCY DISEASES

SOUTH PACIFIC COMMISSION. Noumea, New Caledonia. **The Economics of Food and Nutrition in the United States Trust Territory of the Pacific Islands, April 25–June 2, 1959** [MARAMBA, Manuela G.]. *Technical Information Circular No. 39.* 1960, Apr., 38 mimeographed pp.

WALDMANN, E. **Child Wastage, due to Malnutrition in Sekhukuniland.** *Central African J. of Med.* 1960, July, v. 6, No. 7, 298–301, 6 figs.

The African reserve of Sekhukuniland is in the north east Transvaal, a place with 23 inches of annual rainfall falling within a short period, onto eroded ground. Women, children, and old people form the bulk of the population of 200,000, who live in primitive conditions and for whom the mealie crop is often barely sufficient. Able-bodied men have migrated to the towns to earn wages, with which they return at intervals to provide money for their families.

The women have large families. Breast feeding continues for two years often accompanied by forced feeding with hard porridge from the early weeks. The infants are weaned to mealie porridge, or Kaffir corn, cooked to a stiff

cake, sometimes with spinach ; they may occasionally have cow's or goat's milk well diluted with water. Superstition forbids the use of eggs, and meat is eaten only at feasts. This diet from local produce may be supplemented by sugar, white bread, sweets, jam and occasionally condensed milk, purchased with cash provided by the wage-earner. Malaria is virtually absent, and there is a very low incidence of helminthic disease.

At the Jane Furse Memorial Hospital and its 10 district clinics—a mission hospital which serves this community—suboptimal nutrition of children, shown by stunted growth and defects of skin and hair, is so common a finding, that it would not be classed as "malnutrition" in the hospital diagnosis. Cases classified as "malnutrition" fall into 5 broad groups:—kwashiorkor, nutritional oedema, marasmus, the "miniature toddler", and avitaminoses. The "miniature toddler" has markedly stunted growth and delayed development, without oedema or the stigmata of kwashiorkor. Clinical avitaminoses, usually occurring in older children, are scurvy, avitaminosis A, enlarged parotids, cheilitis and pellagrinous dermatitis.

During 1956, of a total of 1,430 hospital admissions of children under 12 years of age, 64 (4·5%) were diagnosed as "malnutrition". Of these patients 13 died, *i.e.* 20% of a total of 64 deaths of children under 12 from all causes in the hospital, a proportion only equalled by deaths from respiratory infection.

[The author attempts to overcome the difficulty, so common in Africa, of making estimates of the incidence of disease in the absence of any vital statistics for a population, by the use of hospital records. The paper is interesting in its illustration of the nutritional stresses that accompany the change from tribal life to a wage-earning economy, and for its description of a community with severe malnutrition and kwashiorkor, without the common complications of malaria and helminthic disease.] *T. P. Eddy*

CHEN, J. S. & HUANG, C. S. **Dietary and Clinico-Nutritional Survey of Aborigines in Taiwan.** *Metabolism*. New York. 1960, June, v. 9, No. 6, 594–603.

Dietary surveys by home visits were made on a sample of families representative of two tribes of Taiwan aborigines, living in primitive conditions in mountainous country by subsistence agriculture. Nutrient values were estimated with food tables. Average daily diets for adults were found to contain 3335·97 calories but were very deficient in riboflavine (0·14 mgm.) and niacin (2·85 mgm.), low in fat (27·65 gm.), protein (51·56 gm.) and calcium (0·59 gm.). 85% of the protein was of vegetable origin. Though the intake of vitamin A was equivalent to 3,248 IU, this was almost entirely in the form of carotene, and because of the low intake of fat, absorption and utilization may not have been up to expectation.

The prevalence of clinical signs of vitamin deficiencies in 274 schoolchildren 9–15 years of age was approximately: riboflavine, 55 to 65% ; niacin, 35 to 40% ; vitamin A, up to 30%. 16% of boys and half the girls had simple goitre, and height and weight compared unfavourably with similar groups of Chinese and urban children. Stool examinations revealed high rates of parasitic infection. Mothers, infants, and weanling children formed (as is usual) a group especially subject to malnutrition.

[The clinical assessment of nutrition was based on methods used by JOLLIFFE and TUNG (this *Bulletin*, 1957, v. 54, 201) in their survey of the capital town, Taipeh, and its environs, and findings are considered to be comparable. Some practitioners, with the evidence given of an ill-balanced diet with poor quality protein and multiple deficiencies, might hesitate to ascribe the observed clinical skin and mouth signs to specific vitamin deficiencies, rather than to multiple causes. The description of the administrative arrangements required to conduct this survey, from bases reached after several hours' climb from the nearest accessible point for a jeep, would be of general interest to anybody working in rural areas with poor communications.] *T. P. Eddy*

AWWAAD, S., ATTIA, M. & REDA, M. **Electrocardiographic Studies in Nutritional Oedema in Egyptian Children.** *J. Egyptian Med. Ass.* 1960, v. 43, No. 4, 164–71, 4 charts. [11 refs.]

"1—The ECG changes in 25 cases of severe nutritional oedema in Egyptian children between one and four years of age were studied. 2—Abnormalities in the ECG tracings were found in 88% of the cases. The abnormal findings were confined to the QT ratio which was increased in 80%, to the T wave which was markedly reduced in 28% and inverted in 32%, and to the S-T segment which was depressed in 12%. 3—The ECG gives better information about the heart infection in these cases than do X-ray pictures. 4—Potassium therapy corrected T wave changes in 2 out of 5 cases in which it was tried, while B_1 and B_{12} failed to correct the abnormalities in the ECG in another 5 cases. 5—Hypopotassaemia, toxic myocarditis and fatty infiltration of the heart are possible causes for the ECG changes found in nutritional oedema in Egyptian children. Further studies are needed to evaluate each of these factors."

PIRAME, Y. L'ariboflavinose chez l'enfant africain. [**Ariboflavinosis in the African Child**] *Méd. Trop.* Marseilles. 1960, May–June, v. 20, No. 3, 349–61. [51 refs.]

This paper is an interesting essay on the riboflavine deficiency, based on clinical observation and a full study of the literature. The author points out that mucocutaneous degenerations, cheilosis and glossitis are extremely common in African children and often described as ariboflavinosis.

In extensive clinical trials in schoolchildren he showed that these signs usually disappeared on giving either riboflavine or skimmed milk. However, in a minority, varying from 5% to 18% in different trials, the conditions were not improved and in all trials a proportion of untreated controls showed spontaneous improvement, especially in the glossitis. It is concluded that in many, but not all, children cheilosis and mucocutaneous degenerations are indeed the specific result of a lack of dietary riboflavine. Finally it is pointed out that these signs of riboflavine deficiency, although very common, may have only a minor effect on health. The question is then asked: are there perhaps other forms of the deficiency, causing serious ill-health? *R. Passmore*

MIKHOV, C. & DO-HOAI-NAM. Le rachitisme parmi les nourrissons et les petits enfants au Viet-Nam du Nord. [**Rickets in Infants and Small Children in North Vietnam**] *Folia Med.* Plovdiv. 1959, v. 1, No. 4, 257–60.

In the literature at the disposal of the authors it is generally reported that rickets has not been observed, or is extremely rare, in tropical countries. HUTCHINSON is quoted as making the only report of rickets in India—among girls of the wealthy classes, who are forbidden to leave their dwellings unveiled. At Hanoi in North Vietnam they have seen serious cases of rickets and have therefore made this study of its frequency and the factors favouring its development. 2,000 children under 2 years of age were examined, 878 in winter (February–March) and 1,122 in summer (June–July). The mean incidence of rickets was 18·4%, ranging from 15% in the summer examinations to 22·5% in winter. Boys (20·2%) suffered more than girls (16%), and the greatest incidence (33–37%) occurred between the ages of 3 and 6 months. A comparison of children born during the period October–January with those born in the summer, showed that a greater proportion of the winter-children were affected (29%), than of the summer-children (11%).

The occurrence of rickets, with these seasonal differences, is attributed to the climate of North Vietnam, with its marked difference between winter and summer, and to local customs and housing. In winter, temperatures fall to 5° or 10°C., so small children are not allowed out into the open, and the sky is cloudy with an average of only 1–1½ hours of sunshine a day. In summer, there is an average of about 5 hours' sunshine a day, but there are about 15–18 rainy days a month, twice as many as in winter. The rains also reduce the possibility of letting infants out into the sun, but even on sunny days in summer babies are protected from sunshine, as it is so hot after 9 o'clock that they are kept indoors. In villages, bamboo huts are either built without windows, or windows are boarded up; in towns, buildings are closely packed together, windows are obscured, and in the old central areas living-rooms are in semi-darkness at the back of shops, their only source of daylight being the shop windows facing the street. A correlation is also noted between rickets and clothing; among babies aged up to one year, the incidence in those wrapped in one or two swaddling cloths is 22–25%, with three cloths 27%, four cloths 35%, five cloths 50%.

There are serious defects in infant feeding which are contributory causes. Rice pap is the main supplement to milk feeds, with almost no meat, butter or eggs. Rickets is twice as common among artificially fed infants, but even those fed at the breast do not receive sufficient vitamin D, because of the defective nutrition of pregnant women and mothers, and their protection from sunlight with long-sleeved gowns and wide-brimmed hats.

The incidence in the central part of Hanoi, described as the rich quarter, where artificial feeding is most frequently practised and the living quarters are very dark, is high in summer (19%) as well as in winter (24·2%).

[There are a number of records of rickets in India, where the disease is generally described as associated with poverty, and in some places is very common (PATWARDHAN, this *Bulletin*, 1954, v. 51, 1018). D. C. WILSON attributed a high incidence in girls in Lahore to lack of sunlight caused by overcrowding in tall, closely packed buildings, faults in feeding, and the purdah

system, findings similar to those in this paper (*Bull. Hyg.*, 1932, v. 7, 141). Rickets has been reported as prevalent in Freetown, Sierra Leone, and cases of gross bone-deformity attributable to rickets have been seen there—a place with heavy clouds and rainfall, and little sunshine in the wet season.]

T. P. Eddy

HAEMATOLOGY

KARIKS, J. **Hepato-Splenomegaly associated with Anaemia in New Guinea Natives.** *Med. J. Australia.* 1960, May 7, v. 1, No. 19, 730–33. [12 refs.]

This paper is based on a series of clinical surveys carried out by the author over 5 years on Bougainville Island, which has a humid climate which disposes to holoendemic malaria, in the Goilala sub-district of Papua, where similar conditions prevail, and in the Goroka sub-district of the Eastern Highlands of New Guinea. The altitude of the last area ranges from 5,000 to 6,000 feet, and in it malaria is only sporadic.

Throughout New Guinea and Papua, anaemia is widespread; 16·8% of the populations sampled showed a haemoglobin concentration of less than 10 gm. per 100 ml. while only 44·5% had a satisfactory level of more than 13 gm. per 100 ml. [see also this *Bulletin*, 1958, v. 55, 803]. In the humid, malarious, tropical climate of Bougainville Island, all age-groups were affected, though grave anaemia was commoner in the children; in the cooler, mountainous tracts of New Guinea anaemia was mainly found in the infants and children. The author broadly attributes anaemia in Bougainville to malaria, and in the hill districts of the mainland to malnutrition. He considers it an important factor contributing to the mental lethargy and backwardness of the people. A small-scale survey in a single village on Bougainville Island showed an incidence of malarial parasitaemia of 33% [though this figure is not broken down into age-groups], while a nutritional survey in the Goroka area suggested that 13·3% of the children were malnourished, the incidence in those aged 1–3 years being 44·0%.

Hepatosplenomegaly was commoner in children and women of child-bearing age. Of 211 persons who showed this abnormality, 120 were anaemic [with Hb concentration of 10 gm. per 100 ml. or less], 75 were slightly anaemic [Hb concentration between 10 and 13 gm. per 100 ml.], and only 16 had a normal haemoglobin concentration. The author noted that the graver the anaemia, the greater the degree of hepatic and splenic enlargement, while treatment of the anaemia was followed by diminution of the size of both organs.

[These broad clinical observations outline a problem of considerable complexity, and much more research is required in order to assess the interwoven aetiological factors and to determine the actual pathological mechanisms responsible for the enlargement of the liver and spleen.]

[See also *ibid.*, 1955, v. 52, 606.] *J. H. Walters*

CHATTERJEA, J. B. **Haemoglobinopathy in India.** *J. Indian Med. Ass.* 1960, Feb. 1, v. 34, No. 3, 102–10, 7 figs. (6 on 2 pls.) [38 refs.]

A reprint of a communication to the UNESCO and WHO Symposium in September 1957, already available as a chapter in *Abnormal Haemoglobins* [Council for International Organizations of Medical Sciences], published by Blackwell, Oxford, 1959. *Alan B. Raper*

SZEINBERG, A. & SHEBA, C. **Hemolytic Trait in Oriental Jews connected with an Hereditary Enzymatic Abnormality of Erythrocytes.** *Israel Med. J.* 1958, July–Aug., v. 17, Nos. 7/8, 158–68, 2 figs. [34 refs.]

This article describes the distribution among Jews of the red cell abnormality associated with glucose-6-phosphate dehydrogenase deficiency. The work was carried out in Israel and it was notable that the abnormality was restricted to oriental Jews. In addition it was found in Arabs of Central Israel. In some oriental Jews the incidence was very high indeed: 24% in 327 Iraqis, 19% in 48 Persians. None of the 295 western Jews showed the abnormality.

It is of particular interest that the trait has a high incidence among the "Babylonian" (Iraqi) Jews. This group had an independent and continuous existence since 586 B.C. when about 30,000 families were transferred from Judea to Babylon and there maintained racial purity by marrying only within the faith, and to a large extent within the family. The paper states that according to Iraqi doctors the red cell defect is not common among the non-Jewish population of Iraq.

The authors believe that the gene is inherited in a dominant fashion and a number of pedigrees are given. Of particular interest is that a transient glutathione instability of newborns can be differentiated from that associated with the red cell defect in adults. The phenomenon seen in infants is not hereditary, not racially determined, and can be corrected *in vitro* by the addition of glucose to the blood. *H. Lehmann*

NAYLOR, Jean, ROSENTHAL, I., GROSSMAN, A., SCHULMAN, I. & HSIA, D. Y. Y. **Activity of Glucose-6-Phosphate Dehydrogenase in Erythrocytes of Patients with Various Abnormal Hemoglobins.** *Pediatrics.* Springfield, Ill. 1960, Aug., v. 26, No. 2, 285–92, 7 figs. [13 refs.]

Primaquine sensitivity, a reflection of an erythrocytic defect in the enzyme glucose-6-phosphate dehydrogenase (G6PD) is known to be common in Negroes, and in regions where sickle-cell disease occurs. Are the two anomalies genetically connected or clinically interrelated? The authors examined 100 normal Negroes, and 99 with sickle-cell anaemia, 11 with sickle-cell Hb-C disease, 6 with sickle-cell-thalassaemia, and 56 with the sickle-cell trait, estimating the reduced glutathione (GSH) and the G6PD content of the red cells.

The distribution of the G6PD defect was the same in all the above groups, except that in general the enzyme levels were higher in anaemic subjects owing

to the lower average age of their red cells. In studies on 14 families, the gene for the G6PD defect and the gene for sickling segregated independently. Those sickle-cell anaemia subjects with a G6PD defect did not suffer from any increase in "crises", degree of anaemia, or interference with growth, and their erythrocyte survival (measured by ^{51}Cr tagging) was not less than that of other anaemic subjects without the defect. The two characters are genetically and clinically independent. [It remains to be determined whether they are synergistic in respect of protection against malaria.] *Alan B. Raper*

LIVINGSTONE, F. B. **The Wave of Advance of an Advantageous Gene: the Sickle Cell Gene in Liberia.** *Human Biol.* 1960, May, v. 32, No. 2, 197–202, 2 figs.

This study arises from the fact that in some places in Africa the malarial conditions necessary to maintain high frequencies of the sickling gene are more widespread than the foci of high frequency; the postulate that the gene is advancing in some such areas; and the previous observation [this *Bulletin*, 1958, v. 55, 804] that there is a cline in the gene frequency in Liberia from high values in the north-west to low values in the south-east. This last observation was based on samples analysed by tribes, but since the author found that 80% of marriages occur within towns, and a tribal area contains many towns, he supposed that a tribe might contain breeding isolates of very various gene frequencies. He therefore analysed data for several of the central tribes on the basis of Paramount Chiefdoms, each containing on an average 10,000 persons. Data obtained from workers on the Firestone Plantation were added to those from hospital patients, and to those from local sampling.

The result of such a sampling method was that the apparently smooth (tribal) cline in frequency was interrupted by a quite erratic distribution in Central Liberia, where certain chiefdoms of the Bassa tribe showed the highest frequencies in the whole country (26%). Outside this closely analysed region, the frequencies (still on a tribal basis) were high for the north-west and low for the south-east. Since such studies as have been made in Sierra Leone [*ibid.*, 1955, v. 52, 820] and Guinea [*ibid.*, 1957, v. 54, 82] to the north, all revealed high frequencies, the author considers that equilibrium has been reached there, and he views the significant intra-tribal variability in Central Liberia as a feature of areas where the sickle-cell gene has recently begun its rapid rise towards equilibrium.

Although local genetic drift cannot be entirely ruled out, the author thinks the main factors are historical gene flow and selection. For example, the high frequencies among the Bassa of the St. John River region may be traced to the previous presence of a large slaving station and to the inflow of Americo-Liberians. As a final generalization, "it appears that the spread of the high frequencies of the sickle-cell gene in this part of West Africa is due for the most part to the action of selection operating on the few sickle-cell genes which have been introduced into each population". The paper makes no reference to the details of the malarial situation as it affects transmission, morbidity, mortality, or immunity. A table and two useful maps are given.

Alan B. Raper

ANDERSON, Mavis, WENT, L. N., MACIVER, J. E. & DIXON, H. G. **Sickle-Cell Disease in Pregnancy.** *Lancet*. 1960, Sept. 3, 516–21. [31 refs.]

The hazards of pregnancy in sickling subjects have been more precisely defined since the introduction of paper electrophoresis after 1953, and though agreement is not complete, it is generally accepted that mothers of genotype AS are at no special risk, while those of genotypes SC and SS are [this *Bulletin*, 1955, v. 52, 821 ; 1957, v. 54, 1347].

The authors, in Jamaica, followed through pregnancy 9 SS, 7 SC, and 1 "S + F" subjects. Moderate or severe exacerbation of the disease was seen in 8 of the 9 SS mothers, especially in the puerperium. Joint pains were the commonest symptom, with infarction of the lung in 2, cardiac failure in 1, and abdominal crises in 2 patients. In the 7 SC mothers, complications were absent in 4 cases; 2 mothers had mild joint pains, and 1 a splenic infarct. The absence of severe complications in these subjects, and the experience that more than half of the 88 subjects with SC disease seen in Jamaica have never had any significant symptoms, lead the authors to the view that previous reports of severe or fatal complications of pregnancy in SC mothers have dealt with highly selected material, and have not taken into account the many asymptomatic subjects; and the same may be true to a lesser degree for sickle-cell anaemia.

3 of the 17 pregnancies were terminated by Caesarian section, but only 1 of these operations was dictated by reasons connected with sickle-cell anaemia. Only 1 child was lost in this series (an intra-uterine death during an episode of megaloblastic anaemia superimposed on the sickle-cell anaemia of the mother). The birth weights of the children, however, were notably reduced, averaging 5 lb. 10 oz. for the SS mothers, and 6 lb. 9 oz. for the SC mothers, compared with the hospital average of 7 lb. 4 oz. This was not due to prematurity ; it might be related either to sickling stasis in the uterus or placenta, or to deviation of essential growth factors to serve the mother's increased haemopoietic needs. "A study of the utero-placental blood-flow in sickle-cell disease would be valuable."

Conservative treatment during pregnancy is advocated. Adequate protein is necessary but iron is not usually indicated. Transfusion may be necessary, but little is gained by raising the Hb above the level (8·0 gm./100 ml.) usual in sickle-cell anaemia, because this merely causes an inhibition of erythropoiesis. Anaesthesia is not specially hazardous if anoxia is avoided. Premature induction of labour is not required except for obstetrical reasons.

This article gives a very clear presentation of the problem as it occurs in Jamaica, and will be useful to obstetricians in other parts of the world where, however, different environmental factors may be expected to modify some of the conclusions. *Alan B. Raper*

See also p. 1312 GEERAETS & GUERRY, **Clinical Observations on Conjunctival Capillaries with special reference to Sickle Cell Disease.**

SCHLITT, L. & KEITEL, H. G. **Pathogenesis of Hyposthenuria in Persons with Sickle Cell Anemia or the Sickle Cell Trait.** *Pediatrics*. Springfield, Ill. 1960, Aug., v. 26, No. 2, 249–54, 3 figs. [21 refs.]

The failure to excrete a concentrated urine, a known characteristic of sickling subjects [this *Bulletin*, 1956, v. 53, 1376], was further investigated by performing

urine concentration tests on subjects of various ages with either the trait or the anaemia. All anaemic subjects showed considerable hyposthenuria, but only a proportion of the trait carriers did; normal concentrating power was recorded in 80% of the latter aged less than 6 years, and in 29% of those over 6.

Hyposthenuria, therefore, is more severe in sickle-cell anaemia than in the trait, some of the subjects of the latter escaping altogether; in both groups it becomes more apparent at later ages. It is known to be abolished by blood transfusions [*ibid.*, 1957, v. 54, 80], and not to be a reflection of the amount of metabolites presented to the kidney. The authors are unable to ascribe it to a direct gene effect, and find it reasonable to assume that the defect results from tubular dysfunction secondary to the minor sclerotic lesions found in the kidneys of sickling subjects, but they note that critical morbid anatomical evidence on this point is scanty. *Alan B. Raper*

VAN OYE, E. Sur l'association entre ostéomyélite à *Salmonella* et hémoglobinopathie chez l'enfant africain. [**Association between *Salmonella* Osteomyelitis and Haemoglobinopathy in African Children**] *Bull. Soc. Path. Exot.* 1960, Jan.–Feb., v. 53, No. 1, 89–100. [25 refs.]

Surveying the literature, the author finds only about 30 proved examples of the association between *Salmonella* osteitis and abnormal haemoglobins, but abundant presumptive evidence of the connexion. To this he adds 65 cases collected in the Belgian Congo, in 63 of which the organisms isolated from the bony lesions were identified as *Salmonella* of 15 different types, corresponding closely with the incidence of these types in other laboratory material in Léopoldville.

The author's own contribution ends at this point. He is unable to give the precise haematological diagnosis of the patients, but it is clear that (with the exception of one adult female with sickle-cell/thalassaemia) they were mostly infants with sickle-cell anaemia; lesions were usually multiple, affecting mostly the bones of the extremities, and the condition was intractable, with a poor ultimate prognosis. *Alan B. Raper*

MONTGOMERY, R. D. **Tetanus as a Complication of Sickle-Cell Disease.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1960, July, v. 54, No. 4, 385–8. [10 refs.]

Tetanus has been reported to occur as a complication of chronic leg ulceration both in Africa and the New World. Thus in Ibadan, Nigeria, 10% of cases of tetanus showed ulcers [*Bull. Hyg.*, 1958, v. 33, 339] and in Kingston, Jamaica, leg ulceration was noted in 12 out of 100 recent examples of this infection. Chronic ulceration of the lower leg is of frequent occurrence in sickle-cell disease, and it is [fairly] assumed by the author that this portal of entry led to tetanus in 2 adult male patients who appeared to be suffering from this form of haemoglobinopathy.

The first patient, aged 18, showing the SS pattern of haemoglobin on electrophoresis, with 3·7% of foetal haemoglobin, recovered from his tetanus in 5

weeks, but sustained a crush fracture of the 4th thoracic vertebral body, together with anterior erosion of the bodies of the 8th, 9th and 10th thoracic vertebrae. The second patient, aged 20, also showed the SS Hb pattern with 12·3% foetal Hb, but with an excess of target cells which suggested that he might be a double heterozygote for the sickle and thalassaemia genes; he had suffered from recurrent leg ulcers all his life. He too recovered from his tetanus after a severe illness but sustained gross crush fractures of the 4th and 5th thoracic vertebral bodies and some compression of the 6th–9th bodies also.

The author makes a plea for the immunization with tetanus toxoid of all patients attending tropical ulcer clinics, especially those suffering from a haemoglobinopathy. *J. H. Walters*

SWARUP, S., GHOSH, S. K. & CHATTERJEA, J. B. **Haemoglobin E Disease in Bengalees.** *J. Indian Med. Ass.* 1960, July 1, v. 35, No. 1, 13–15, 2 figs. [21 refs.]

By describing 3 patients with homozygous Hb E disease, for 2 of whom family studies were possible, the authors draw attention to the occurrence of this syndrome in Bengalis, in addition to the commoner and slightly more benign Hb E/thalassaemia. The presenting symptom of tiredness, and the finding of a mild anaemia without reticulocytosis or splenomegaly but with diminished fragility of the red cells, require, before the diagnosis is established, the electrophoretic demonstration of Hb E as the sole adult Hb component, and a family study to exclude thalassaemia as a pathogenetic factor. (Failure to transmit Hb E to any offspring of course excludes the homozygous state.)

Alan B. Raper

DITTMAN, W. A., HAUT, A., WINTROBE, M. M. & CARTWRIGHT, G. E. **Hemoglobin H associated with an Uncommon Variant of Thalassemia Trait.** *Blood.* 1960, July, v. 16, No. 1, 975–83, 6 figs. [29 refs.]

" A 26 year old American housewife of Sardinian extraction with chronic hypochromic anemia was found to have a hemoglobin component identical to hemoglobin H. The A_2 hemoglobin fraction was decreased. Relatives were found to exhibit the hematologic features of thalassemia trait. In this pedigree, in contrast to the usual finding in the ' thalassemia trait ', the A_2 values were not increased. The same observation had been made in the only other comparable report."

[See this *Bulletin*, 1958, v. 55, 1043.]

SEN GUPTA, P. C., CHATTERJEA, J. B., MUKHERJEE, A. M. & CHATTERJI, A. **Observations on the Foam Cell in Thalassemia.** *Blood.* 1960, July, v. 16, No. 1, 1039–44, 2 figs. [13 refs.]

" Histologic and histochemical study of the foam cell in the spleen in thalassemia has shown that the foamy appearance is due to the accumulation of an

acidic mucopolysaccharide of the chondroitin sulfuric acid type in the cytoplasm of this histiocytic cell. This polysaccharide shows intense red coloration with the periodic acid Schiff reaction, which is thus of great value in demonstrating the foam cell in tissue sections. The possible sources of this mucopolysaccharide have been discussed."

VENOMS AND ANTIVENENES

HAFFKINE INSTITUTE. **Proceedings of the Symposia held during the Diamond Jubilee, Jan. 10 to 14 1959. VI. Symposium on Venoms** [pp. 128–39, 3 figs. (21 refs.)] 154 pp. 1960. Bombay 12.

There were 4 papers constituting the symposium on venoms: (1) *The Newer Knowledge of Snake Venoms and the Anti-Venomous Therapy* (pp. 128–130) by Afranio DO AMARAL; (2) *A Preliminary Electrophoretic Study of Unimmunized and Immunized Horse Sera using Haemotoxic and Neurotoxic Antigens* (pp. 131–134) by O. KETUSINH and C. PURANANANDA; (3) *Enzymes in relation to the Neurotoxic Action of Cobra Venom* (pp. 135–139) by B. M. BRAGANCA and I. ARAVINDAKSHAN; (4) *Proteolytic Activity of Venoms of Indian Snakes* (p. 139) by Shanta S. RAO, L. S. KADABA and S. S. RAO.

It was difficult to understand exactly what the author of the first paper was trying to convey. This was probably due in part to language difficulties and the curious construction of the paper which was a mixture of simple sentences and very condensed biochemical and pharmacological information. The other 3 papers were all biochemical in nature, the most straightforward paper being the study of the primary biochemical changes brought about by the neurotoxin of cobra venom. The senior author, Braganca, in his previous studies in conjunction with Professor QUASTEL [this *Bulletin*, 1953, v. 50, 338] had obtained results which indicated the important role played by lecithinase in the neurotoxic action of cobra venom and the present well-constructed contribution on the subject offers further evidence of the importance of this enzyme.

H. J. Bensted

RECHNIC, J., DE VRIES, A., PERLMUTTER, C., LEVI, G., KOCHWA, S. & GITTER, S. **Coagulation Factors in the Venoms of** *Vipera palestinae* **and** *Echis colorata*. *Bull. Res. Counc. of Israel*. 1960, Apr., v. 8E, No. 3, 81–6, 1 fig. [25 refs.]

"A study of the effects of *Vipera palestinae* and *Echis colorata* venoms on human blood revealed procoagulant and anticoagulant activities in both. Chromatographic analysis of the venoms on ion exchange resins was carried out and the mechanism of action of the separated venom factors affecting the coagulation process was studied.

"The procoagulant of *Vipera palestinae* venom accelerates the formation of fibrin from fibrinogen by thrombin, that of *Echis colorata* venom converts prothrombin to thrombin.

"The anticoagulant of *Vipera palestinae* venom inhibits the evolution of plasma thromboplastin, probably by action on a thromboplastin intermediate, whereas the anticoagulant of *Echis colorata* venom is fibrinogenolytic and fibrinolytic.

"Evidence is presented to show that the hemorrhagic action of these snake venoms is primarily due to hemorrhagins causing damage to the blood vessels, the anticoagulants aggravating the hemorrhage thus initiated."

OHSAKA, A. **Proteolytic Activities of *Habu* Snake Venom and their Separation from Lethal Toxicity.** *Japanese J. Med. Sci. & Biol.* 1960, Apr., v. 13, Nos. 1/2, 33–41, 4 figs. [30 refs.]

"Zone electrophoretic fractionation of *Habu* venom revealed that at least five electrophoretic components of proteolytic activity on casein were present in this venom and could be categorized into at least three distinct enzymes.

"It was also indicated that at least the main part of lethal toxicity and that of proteolytic activity on casein were independent of each other."

KONDO, H., KONDO, S., IKEZAWA, H., MURATA, R. & OHSAKA, A. **Studies on the Quantitative Method for Determination of Hemorrhagic Activity of *Habu* Snake Venom.** *Japanese J. Med. Sci. & Biol.* 1960, Apr., v. 13, Nos. 1/2, 43–51, 4 figs.

"A quantitative and reproducible method was proposed for estimating hemorrhagic activity of the venom of *Trimeresurus flavoviridis* (*Habu*), a *Crotalidae*.

"1. Clear-cut and easily measurable hemorrhagic spots were recognizable in the rabbit skin provided that observation was made of the inside of the removed skin 24 hours after the inoculation.

"2. By the statistical analyses of the results with a large number of venom preparations a distinct correlation was established between log doses of venom and size of hemorrhagic spots, and log-dosage response curves were proved to be linear and parallel with each other. Common slope $\bar{b}$ was 3·980 and common variance s^2 was 0·612.

"3. Based on the parallel line assay method, the hemorrhagic activity of venom could be determined in terms of relative potency to the reference standard venom. The fiducial limits for the relative potency was about ±50% at 95% level of probability under the above described conditions."

OHSAKA, A., IKEZAWA, H., KONDO, H. & KONDO, S. **Two Hemorrhagic Principles derived from *Habu* Snake Venom and their Difference in Zone Electrophoretical Mobility.** *Japanese J. Med. Sci. & Biol.* 1960, Apr., v. 13, Nos. 1/2, 73–6, 1 fig.

TOXOPLASMOSIS

BEATTIE, C. P. **The Epidemiology of Toxoplasmosis.** Reprinted from *Human Toxoplasmosis*. 1960, Copenhagen: Munksgaard. 175–83. [Numerous refs.]

The epidemiology of toxoplasmosis is reviewed in the light of recent observations by the author. It has often been suggested that the high incidence of the infection as shown by serological evidence was false and due to cross-reactions with other organisms [this *Bulletin*, 1952, v. 49, 322; 1953, v. 50, 1083; 1955, v. 52, 84, 480]. 38 patients with trichomoniasis, 17 with trypanosomiasis and 85 with malaria in the past were examined, and their sera gave dye test and complement-fixation reactions of a similar pattern to the normal population with no greater frequency of high titre antibody levels.

It is still a puzzle why the infection is sometimes pathogenic to man and sometimes not: this must be either a question of the parasite or the host. Human strains vary in virulence when injected into mice, but if the mice are treated with cortisone the virulence of non-pathogenic strains is immediately enhanced.

The problem of transmission is still unsolved, except for the congenital form, and even here it is uncertain whether the infection is acquired by the foetus from a recent or chronic latent maternal toxoplasmosis. It is probable that animals play some part in conveying the infection to man, because of the strikingly high incidence in rabbit handlers and trappers; but inter-human transmission is equally likely, and an episode is described where two boys slept in one bed and both developed the disease with an interval of 4 months between the respective onsets. The route of infection is still unknown, but the main portal of entry may be through the tonsillo-pharyngeal region. *P. C. C. Garnham*

JYONO, K. **[Surveys of *Toxoplasma* Antibodies in Groups of Man and Rats, and on Suitable Conditions of Dye Test]** *J. Osaka City Med. Center.* 1960, June, v. 9, No. 6, 1907–25. [55 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"Observations were made of a survey of the incidence of Toxoplasma antibodies on dye-test and intradermal reaction in various groups of man and rats, that is, 55 healthy subjects, 196 ophthalmic patients, 340 gynecologic patients and 140 house rats. Mice ascites which influenced dye-test was simultaneously studied. The results obtained were as follows:

"1) Positive rates of intradermal reaction were shown in 5·5% of the healthy subjects studied, in 15·8% of the cases of chorioretinitis, in 19·4% of the cases of uveitis, in 11·1% of the cases of iridocyclitis, in 21·5% of the cases of retinitis, in 7·0% of the normal pregnant cases and in 26·5% of the cases of abortion or premature delivery.

"2) In both ophthalmic and gynecologic cases, positive rates of intradermal reaction increased with age.

"3) Positive rates of dye-test were shown in 6·6% of the cases of chorioretinitis studied, in 14·3% of the cases of uveitis, in 11·1% of the cases of

iridocyclitis and in 7·1% of the cases of retinitis. The positive rates were shown in 12·0% of Rattus norvegicus, but not in Rattus rattus.

"4) Isolation of Toxoplasma from 48 house rats was non-successful.

"5) In experimental mice toxoplasmosis, pH of ascites varied daily from 7·2 to 6·8.

"6) Mice ascites, produced 3 days after Toxoplasma was inoculated, is most suitable for dye-test.

"7) Toxoplasma which had invaded culture HeLa cells were stained in the same grade (by alkaline methylene blue) as those obtained from mice ascites.

"8) A borax buffer with pH 11·0 for methylene blue solution, was the most suitable for dye-test.

"9) Variations of pH in mice ascites caused by an addition of phosphate or borax buffer solution led to changes in the results of dye-test."

JYONO, K. *et al.* **[On the Survival Conditions of *Toxoplasma* in Various Kinds of Liquid Media]** *J. Osaka City Med. Center.* 1960, June, v. 9, No. 6, 1999–2005. [In Japanese.]

The English summary appended to the paper is as follows:—

"The survival conditions of Toxoplasma gondii in various kinds of liquid media, as to fundamental studies of epidemiology for an infectious route of protozoa, have been studied with the following results:

"1) In peptone solution, bouillon, Tyrode's solution, 10% serum solution and 10% serum bouillon, infectious potentiality of protozoa remained for 10 days.

"2) Infectious potentiality of protozoa remained for 15 days in Kirchner's solution, showing the most favorable result.

"3) In saline solution infectious potentiality of protozoa remained for 15 hours.

"4) It seems protozoa show the most favorable survival at 0°C–18°C and pH 7·2."

TOMITA, T. **[A Study on Oxygen Consumption in Organs of *Toxoplasma* Infected Mice]** *J. Osaka City Med. Center.* 1960, May, v. 9, No. 5, 1713–29, 13 charts. [31 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"A study is made of oxygen consumption in organs of mice which are infected with Toxoplasma with the following results:

"1) The oxygen consumption in the absence of glucose used as substrate is less than that of controls.

"2) The oxygen consumption of Toxoplasma infected mice in the presence of glucose is higher than that of controls.

"3) The oxygen consumption of Toxoplasma infected mice in the brain and kidneys in endogenous respiration and [exogenous] glucose respiration is similar to that of controls.

"4) The oxygen consumption of Encephalitozoon infected mice is similar to that of controls. But in the spleen it ranges between Toxoplasma infected mice and controls.

"5) The oxygen consumption of Toxoplasma infected mice following a 3 consecutive day administration of Daraprim, except in the spleen, is similar to that of controls.

"6) Addition of Daraprim to a Toxoplasma containing suspension results in a marked respiration inhibitory action in Toxoplasma.

"7) Existence of glucose results in a marked increase of respiration in Toxoplasma.

"8) Three days after being infected with Toxoplasma the spleen shows an average increase of 71·7% in weight, the liver 14·0% and the lungs 7·8%. The brain and kidneys show no increase over controls.

"9) Three days after being infected with Toxoplasma mice showed a medium hypochromic anemia with a marked decrease in leucocyte count."

WATANABE, Y. **[Studies on the Therapeutic Agents for Human Toxoplasmosis, especially about Antitoxoplasmic Activity]** *J. Osaka City Med. Center.* 1960, June, v. 9, No. 6, 1981–97, 3 charts. [18 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"Observations were made of antitoxoplasmic activities of various antibiotics, sulfonamides and Daraprim against Toxoplasma gondii experimentally infected in mice and of Daraprim against the parasites in invaded culture HeLa cells in vitro. The results obtained were as follows:

"1) Among the antibiotics tested, chlortetracycline was the most effective for mice toxoplasmosis. Following chlortetracycline treatment the infected mice survived about 14-15 days and this survival period was prolonged about twice that of the nontreated infected mice. Following a treatment with other antibiotics the survival of infected mice was not prolonged.

"2) Of the sulfonamides tested, sulfadiazine was the most effective for mice toxoplasmosis. Following this treatment the survival of the infected mice prolonged 6 days or more. Following a massive administration, the infected mice survived more than 26 days.

"3) Antitoxoplasmic activities were not observed following γ-globulin administration in vivo.

"4) The effective dose of Daraprim for mice toxoplasmosis was about 0.075–0.1 mg. per cc, and this dose has no toxic effects for mice.

"5) Synergic effects were not observed by a combined administration of Daraprim and chlortetracycline, but by a combined dosage of Daraprim and sulfadiazine the infected mice survived more than 20 days.

"As a results of the examination of smear specimens of infected mice ascites, it seems probable that those antitoxoplasmic drugs tend to limit a proliferation of the Toxoplasma in the mice ascites.

"6) Growth inhibiting effects of Daraprim for HeLa cells were not observed.

"7) Daraprim inhibits the invasion of Toxoplasma into HeLa cells in culture media.

"8) Daraprim seems to inhibit the growth and pseudocyst formation of the Toxoplasma in HeLa cells."

EYLES, D. E. & COLEMAN, Nell. **The Effect of Metabolites on the Antitoxoplasmic Action of Pyrimethamine and Sulfadiazine.** *Amer. J. Trop. Med. & Hyg.* 1960, May, v. 9, No. 3, 277–83.

Sulphadiazine and pyrimethamine interfere at different points in the metabolic synthesis of folinic acid from *p*-aminobenzoic acid (PAB). An organism which depends upon this synthesis is therefore affected by either drug and when both drugs are given together the effect is greatly enhanced. Potentiation of pyrimethamine by sulphadiazine has been demonstrated against bacteria, malaria parasites and toxoplasms; the drugs are used together in the treatment of human toxoplasmosis.

Man does not synthesize his own folic and folinic acid, he absorbs it ready-made from the intestine; it should therefore be possible to give supplements of these metabolites without interfering with the action of sulphadiazine or pyrimethamine upon a parasite. [Folic and folinic acids do not affect the antimalarial action of pyrimethamine (this *Bulletin*, 1960, v. 57, 100).]

The present paper describes the action of sulphadiazine, pyrimethamine and varying amounts of PAB, folic or folinic acid upon lethal toxoplasma infections of mice. Untreated mice died in 7 days; the effects of drugs and metabolites administered in the diet were assessed by the percentages of mice which survived 14 days and which were cured at the end of the experiment (42 days). Tests for cure were carried out by inoculating the tissue of the survivors into uninfected mice. PAB completely antagonized the curative action of sulphadiazine and partially antagonized the effect of pyrimethamine alone, or with sulphadiazine. Folic acid partially antagonized the action of sulphadiazine but had no effect upon pyrimethamine or the two drugs given together.

Folinic acid did not significantly affect the action of either drug alone, or of the combination.

Folic or folinic acid might therefore be used to decrease the toxic side effects of large doses of pyrimethamine and sulphadiazine in man, without materially affecting antitoxoplasmic activity [*ibid.*, 1958, v. 55, 573]. Folinic acid is known to relieve the toxic effects of pyrimethamine in man; more information is needed upon the corresponding effect of folic acid. *L. G. Goodwin*

TROPICAL OPHTHALMOLOGY

GEERAETS, W. J. & GUERRY, D. **Clinical Observations on Conjunctival Capillaries with special reference to Sickle Cell Disease (Preliminary Report).** *Southern Med. J.* 1960, Aug., v. 53, No. 8, 949–52. [14 refs.]

"Clinically observable vascular changes in the conjunctiva have been described with special reference to sickle cell disease. The behavior of the intracapillary blood column and changes of the vessel wall as a diagnostic sign of systemic conditions have been described. Observations were made on conjunctival capillaries under magnification of 40 to 125 times. The effect of carboanhydrase inhibitors on intravascular sickling was studied in vivo.

"It was found that in 7 patients the conjunctival capillaries reopened and normal blood flow returned. In 4 patients the effect was questionable; and in one patient, intravascular stasis and clumping seemed to increase. No effect was noted in the remaining patients. Changes were seen approximately 2 to 3 hours after the medication was given."

[The studies were made on 50 patients in Richmond, Virginia.]

SHATKIN, A. A. & TERSKEKH, I. I. **The Aetiology of Trachoma.** *Problems of Virology*. London. 1959, v. 4, No. 6, 1–6. [60 refs.] [Translated from Russian.]

POLEFF, L. Culture de l'agent étiologique et son importance dans la pathologie et la thérapeutique du Trachome. [**Culture of the Aetiological Agent of Trachoma and its Importance in Pathology and Treatment**] *Rev. Internat. du Trachome*. 1960, v. 37, No. 3, 502–16. [44 refs.]

DERER, J., KLIMESOVA, N. & ELISCHEROVA, E. Cortison als Hilfsmittel zur diagnostik des klinisch geheilten sowie des Initial-dubiösen Trachoms. [**The Use of Cortisone in the Diagnosis of Clinically Healed and Initially Doubtful Trachoma**] *Rev. Internat. du Trachome*. 1960, v. 37, No. 3, 463–71.

The English summary appended to the paper is as follows:—

"It is generally known that cortisone applied to the conjunctival sac may activate a latent, clinically apparently healed trachoma. It was, however, as yet not proved whether clinically healed cases of trachoma which do not respond to cortisone are really healed.

"The authors ascertained in a long term follow up of 34 patients, in which no reactivation occurred after cortisone, that 32 cases remained unchanged, a slight recurrence being observed in 2 cases only. From this observation they conclude that a negative cortisone test is a sign of a definitely healed trachoma.

"It was ascertained further, whether the cortisone test is reliable in diagnosis of dubious cases. Cortisone test was performed in 45 cases suffering from suspect follicular conjunctivitis. A long term follow up of these cases proved, similarly as in healed trachoma, the reliability of cortisone test in the diagnosis of uncertain cases of trachoma. A negative reaction to cortisone in uncertain cases indicates that the patient has no trachoma."

MALO, C. De l'essai de l'emploi de la spiramycine dans le traitement de masse du Trachome à Marrakech. [**Trial of "Spiramycin" in the Mass Treatment of Trachoma in Marrakech**] *Rev. Internat. du Trachome*. 1960, v. 37, No. 3, 472–80.

The English summary appended to the paper is as follows:—

"The author has examined 882 children belonging to two Marrakech schools, one Jewish the other Moslem.

"489 were not affected, 161 had TI, TII.

"232 had TIII, TIV.

"The 161 TI, TII were treated twice daily during two months by spiramycin ointment.

"Results: 44.1% total recovery without sequelae, 44% passing to stages III and IV, 11.9% failure. Spiramycin seems thus active and useful.

"The author then passes in review the main antibiotics and studies their different value as anti-trachoma agents, based on the opinion of several trachomatologists.

"Finally he wishes that further studies be realised to confirm the value of spiramycin and its place amongst aureo, terra, erythro, anti-trachoma products of undoubtful effectivity."

TROPICAL ENVIRONMENTAL CONDITIONS

RENBOURN, E. T. **Physiological Problems of the Soldier in Tropical Warfare. An Operational Approach.** *J. Roy. Army Med. Corps.* 1959, Oct., v. 105, No. 4, 172–82.

This article reveals wide insight into the physiological needs of the soldier. Fear of the sun, of a damp air and of tropical disease led in early days to the topee, spine pad and the cholera belt. Irrational fears still persist, *e.g.* the fear of impotence from antimalaria tablets.

The climatic chamber has permitted many questions to be answered but the absence of desert sunlight, diurnal temperature change, dust and glare, jungle rain, damp clothes, the ration pack, disease-bearing pests, poor sleep and loneliness render it a poor copy of the actual tropical environment. The author likewise doubts that artificial acclimatization reproduces completely the natural one.

The features of heat illness are described and some contributory factors (the author does not believe in extra salt in the tropics). Physical fitness is important but the Harvard Pack Test may give a misleading indication of this, depending as it does on well developed calf muscles. The skin should receive close attention—two cold showers or wash downs are claimed to be essential. Diet, drinking water, rest and the treatment of clothing are discussed. Protection against atomic flash must now be considered as well as leeches, insects, sun and thorns. Nylon and terylene are not suitable for tropical underclothing but are apparently suitable for socks or insoles.

In conclusion personal hygiene and high morale are of first importance. Research is still required, notably on the weight of the jungle load and on tropical clothing. *M. L. Thomson*

LEITHEAD, C. S. & PALLISTER, M. A. **Observations on Dehydration and Sweating.** *Lancet.* 1960, July 16, 114–17, 2 figs. [30 refs.]

In order to settle the vexed question whether the rate of sweating is reduced during dehydration, 18 fit young men of the Royal Air Force were examined before and after arriving by air in Bahrein from England.

The subjects felt well and were able to carry out skilled duties at DBTs of 94°F. and WBTs of 81°F. but were found to be moderately dehydrated.

On days when their weights (measured to within ±5 gm.) were below average the subjects passed less urine, and when they changed posture from lying to standing they had faster pulse rates and smaller pulse pressures than on days when their weights were above average. It has been assumed that on days when weights were below average dehydration was present.

There was a significant direct relation between initial body weight and mean 24-hour urine output on the one hand and with mean sweat rates (determined by weight loss over 2-hour periods adjusted for food and fluid intake and excretory loss) on the other. *M. L. Thomson*

LEITHEAD, C. S. **Dehydration and Death in the Desert.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1960, July, v. 54, No. 4, 297–8. Discussion 298–9 [BOYD, J.].

This dramatic story might have come straight from the pen of O. Henry. Two Indian youths suffered greatly and one died in the desert from dehydration when the radiator of their car, from which they had unwisely wandered, was full of water.

The car had left the road during a sand storm: after struggling to get the car back on the road again they attempted to walk to the nearest town in an air temperature of 110°F. and soon became completely lost.

The author contends that the cause of death was heat stroke contributed to by dehydration. He discusses evidence, including an investigation by himself and PALLISTER, on air-force recruits in Bahrein, that sweating rates are reduced where there is dehydration [see above]. *M. L. Thomson*

PARASITOLOGY: GENERAL

TANGHERONI, W., POLI, L., MORELLI, A. & VENEZIA, A. Osservazioni sulla terapia delle parassitosi intestinali dell'infanzia. [**Observations on the Treatment of Intestinal Parasitic Infections in Children**] *Giorn. di Malattie Infettive e Parassit.* 1960, Mar.–Apr., v. 12, Nos. 3/4, 168–71, 2 graphs. [16 refs.]

The authors have carried out a search for intestinal parasites in the inmates of 3 children's homes and tried a variety of drugs against the protozoa and the helminths which occurred. One home in Pisa had 35 children, aged from

18 months downwards, and about one-third of these had been having slight diarrhoea from time to time with no other evidence of illness. The only intestinal parasite found was *Giardia intestinalis*—in 10 of the children. Both erythromycin and oxytetracycline were given but failed.

The 43 inmates of another home—also in Pisa—were aged 2–6 years and had also been having slight diarrhoea from time to time without impairment of their general condition. Every child was found to harbour several parasites —as many as 5 or 6 different species in some cases—in various combinations. These children were treated with a " polyvalent " preparation, containing piperazine with Vioform and Atebrin [mepacrine], by mouth: 2 successive courses resulted in the disappearance of the flagellates and of *E. coli*, *Endolimax nana* and *Iodamoeba bütschlii*, but *Hymenolepis* and *Trichuris* survived this treatment. Oxytetracycline achieved control of *E. histolytica*, cysts of which were found in 9 children.

Another home was investigated in Leghorn and had 29 children, aged 3–6 years, with no history of diarrhoea or other complaints. Their stool specimens produced 6 species of protozoa and helminths and every child had one or more. They were given tablets by mouth of a new preparation combining a phenanthrenequinone with enterovioform. This produced no side effects and was well tolerated, but some of the smaller children found the tablets hard to swallow. *E. coli* and *E. nana* were partially controlled, *Giardia* was slightly affected but *Hymenolepis* and *Trichuris* were more or less resistant. *J. Cauchi*

MISCELLANEOUS DISEASES

ANDRÉEV, I., VAPTZAROV, I. & ANGUÈLOV, A. Le favisme en Bulgarie. **[Favism in Bulgaria]** *Folia Med.* Plovdiv. 1959, v. 1, No. 4, 211–15, 1 fig. [10 refs.]

PEPLER, W. J. & MEYER, B. J. **Interarterial Coronary Anastomoses and Coronary Arterial Pattern. A Comparative Study of South African Bantu and European Hearts.** *Circulation.* New York. 1960, July, v. 22, No. 1, 14–24, 5 figs. [37 refs.]

" The coronary arterial pattern and coronary anastomoses have been investigated in 90 European and 98 Bantu hearts.

" A significantly better coronary anastomotic blood supply has been demonstrated in Bantu hearts. This was found to be present from a very early age onward and not related to hypertrophy, atherosclerosis of the coronary arteries, or to gross anatomic differences of the arterial tree, such as a third primary division of the left coronary artery. The latter was found to be more common (74 per cent) in Bantu than in European hearts (38 per cent).

"It is suggested that the reason for the better anastomoses might be the high incidence of megaloblastic and iron-deficiency anemia in Bantu children.

"The low incidence of the severe degrees of coronary atherosclerosis and its complications has been reaffirmed in the Bantu hearts."

BENNETT, J. H., GRAY, A. J. & AURICHT, C. O. **The Genetical Study of Kuru.** *Med. J. Australia.* 1959, Oct. 10, v. 2, No. 15, 505–8, 4 figs.

[See also this *Bulletin*, 1959, v. 56, 565.]

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

SHALABY, A. M. **Forced Retention of Eggs in** *Culex* (*Barraudius*) *pusillus* **Macq. (Diptera: Culicidae.)** *Indian J. Malariology.* 1959, Dec., v. 13, No. 4, 199–208, 1 graph & 1 pl. [11 refs.]

ROZEBOOM, L. E. & HOBBS, J. **Inheritance of DDT Resistance in a Philippine Population of** *Culex pipiens fatigans* **Wied.** *Bull. World Health Organization.* Geneva. 1960, v. 22, No. 5, 587–90.

Text and tabular matter record crossing, and back-crossing, experiments between a DDT-resistant strain of *Culex pipiens fatigans*, originating from the Philippines, and a DDT-susceptible laboratory strain of *C. p. pipiens* founded some years before from mosquitoes taken near Baltimore. The data are highly variable and do not, the authors note, give satisfactory statistical clarity. Various reasons for variability are discussed and the conclusion suggested is that the experiments do, in fact, indicate that DDT resistance in the Philippines *C. p. fatigans* population is due to a single dominant gene. *D. S. Bertram*

CHRISTOPHERS, S. R. *Aëdes aegypti* **(L.) the Yellow Fever Mosquito: its Life History, Bionomics and Structure.**

This book was reviewed on p. 968.

See also p. 1258, THOMAS, **Notes on the Mosquitoes and Mosquito Borne Infections of Sierra Leone. (I) The Breeding Places of** *Aedes* (*Stegomyia*) *aegypti* **in and around Freetown.**

HUDSON, Anne, BOWMAN, L. & ORR, C. W. M. **Effects of Absence of Saliva on Blood Feeding by Mosquitoes.** [Correspondence.] *Science*. 1960, June 10, v. 131, 1730–31, 1 fig.

With the use of needles of tungsten wire of 10 μ diameter, the salivary duct was exposed by dissection of the neck (underside) of *Aëdes stimulans* and *A. aegypti* anaesthetized with carbon dioxide. Survival rates were low but 24 hours after the operation 12 *A. stimulans* were available and bit a human subject. They failed to cause reaction although this occurred at the site of biting by normal mosquitoes. Operated mosquitoes appeared to use their mouthparts with normal facility; there was no obvious difference of blood-clotting in the stomach between them and controls; egg development took place. The work with *A. aegypti* is in progress and, here again, any function the salivary secretion may have is not yet clear. Some emphasis is given to an adaptive importance of an anaesthetic component in salivary secretion. Bites of *A. stimulans*, unaccompanied by saliva due to severing the salivary duct, were more painful than bites of the normal mosquitoes. The amount of irritation inflicted on a host could be a factor influencing vector efficiency. *D. S. Bertram*

DOBY, J. M. & DAVID, F. Présence en France (Dordogne, Pyrénées Orientales, Haute-Savoie, Bas-Rhin, Pas-de-Calais, Manche et Côtes-du-Nord) de la forme *spinosum* Doby et Deblock, 1957, de *Simulium ornatum* Meigen, 1818 (Diptères-Simuliidés). [**Presence of the *Spinosum* Form of *Simulium ornatum* in France**] *Ann. Parasit. Humaine et Comparée*. 1960, Apr.–June, v. 35, No. 3, 387–90.

FREDEEN, F. J. H. & SHEMANCHUK, J. A. **Black Flies (Diptera: Simuliidae) of Irrigation Systems in Saskatchewan and Alberta.** *Canadian J. Zool.* 1960, Aug., v. 38, No. 4, 723–35, 6 figs. (5 on 2 pls.) [14 refs.]

FREDEEN, F. J. H. **Bacteria as a Source of Food for Black-Fly Larvae.** [Correspondence.] *Nature*. 1960, Sept. 10, v. 187, 963.

FREDEEN, F. J. H. **Collection, Extraction, Sterilization and Low-Temperature Storage of Black-Fly Eggs (Diptera: Simuliidae).** *Canadian Entomologist*. 1959, July, v. 91, No. 7, 450–53.

Long storage of simuliid eggs is a desirable convenience for research in Canada during the many months when black-fly are not available in nature. During the oviposition season (June to August) eggs were collected of several species, some of these depositing them in flight. A plankton net sieved eggs from the water surface, and dredges were used to take up bottom sediments containing eggs. Flotation in 1 part sodium chloride and 4 parts water, churned or briskly stirred, separated eggs which were then filtered off and washed through graded mesh-screens (0·1 mm. retained eggs finally). Brine flotation for more than an hour damaged the eggs. The best yield was 14,000 eggs of *Cnephia*

dacotensis in 1 cu. ft. sample. Sterilization from contaminations was complete with 3 hours in 5% sodium hydroxide solution. This promoted hatching success and increased rate of embryonic development—probably related to dissolution of the binding matrix of the egg masses. Low temperature storage was also improved. Mercuric chloride at 0·1% killed eggs in 15 seconds before sterilization was effective (required 2 minutes). Eggs were finally stored on sterile damp filter paper, or in sterile water, in sealed jars. For *Simulium venustum*, which overwinters in the egg stage, 35% were viable after a year at 0·5 to 1·5°C., a few for 2½ years. *S. vittatum* overwinters as a larva and appreciable survival of eggs at 0·5 to 1·5°C. lasted only during the first week. It seemed that they tend to hatch at this temperature, probably an adaptive factor ensuring larvae for overwintering in nature. *C. dacotensis, S. arcticum, S. aureum, S. decorum, S. luggeri* and *S. meridionale* survived such storage for 2 to 9 months. Some of these species are suited to these conditions, overwintering in nature as eggs. Storage at −79°C. failed with *S. venustum* and *S. vittatum*. In numerous laboratory experiments, the larvae and adults bred from stored eggs appeared quite normal in vitality and survival. *D. S. Bertram*

See also p. 1265, YAMADA, **[Studies on Body Passage of *Musca vicina* Macquart with Several Protozoa]**.

WINTERINGHAM, F. P. W., HELLYER, G. C. & MCKAY, M. A. **Effects of the Insecticides DDT and Dieldrin on Phosphorus Metabolism of the Adult Housefly *Musca domestica* L.** *Biochem. J.* 1960, Sept., v. 76, No. 3, 543–8, 1 fig. [11 refs.]

OPPENOORTH, F. J. & VAN ASPEREN, K. **Allelic Genes in the Housefly producing Modified Enzymes that cause Organophosphate Resistance.** *Science*. 1960, July 29, v. 132, 298–9.

"In all of six phosphate-resistant strains of *Musca domestica* L. a mutant gene is present which produces an altered ali-esterase. The modified enzymes are no longer irreversibly inhibited by the oxygen analogs of the insecticides to which the strains are resistant but can slowly convert them. In five of the strains the resistance is caused by this gene only."

[See this *Bulletin*, 1960, v. 57, 960.]

TAHORI, A. S. **The Larvicidal Effect of Phenylthiourea against Resistant and Susceptible Housefly Strains.** *Bull. World Health Organization*. Geneva. 1960, v. 22, No. 5, 584–5. [Refs. in footnotes.]

Phenylthiourea (PTU) mixed with larval breeding medium of house-fly cultures (DDT-susceptible, DDT-resistant, dieldrin-resistant, lindane-resistant and malathion-resistant strains) at 1,700, 2,125 and 2,550 p.p.m. gave no correlation between PTU and DDT or other chlorinated hydrocarbon insecticide. The complete kill by PTU of the malathion-resistant strain is thought, perhaps, to

be a "strain characteristic" and not a negative correlative linkage of the two compounds. PTU is not a good larvicide. It seems to slow down larval growth; 3rd stage larvae can be killed by it but at 8,500 p.p.m.

[This paper never gives the name *Musca domestica*. Surely it ought to be clearly stated once?] *D. S. Bertram*

LEWIS, D. J. **Notes on *Chrysops bicolor* Cordier (Diptera: Tabanidae) in Tanganyika.** *Proc. Roy. Entom. Soc. of London.* Ser. A. 1960, July 15, v. 35, Pts. 4/6, 75–8, 14 figs. [14 refs.]

DU TOIT, R. & MEYER, Hennie. **A Case in South Africa of Ocular Myiasis in Man due to the First-Stage Larvae of the Nasal Bot Fly of the Sheep (*Oestrus ovis* L.).** *South African Med. J.* 1960, July 9, v. 34, No. 28, 581–2, 2 figs. [10 refs.]

"A South African human case of infection of the eye with the first-stage larvae of the nasal bot fly of the sheep (*Oestrus ovis*) is described. This appears to be the first case recorded in the Union.

"The literature recording similar cases in other parts of the world is cited.

"Reference is made to myiasis with Gedoelstia species in blue wildebeeste and hartebeest, which occasionally occurs in epidemic form in sheep, cattle and horses, and has been recorded in one case in man in the Kuruman district."

HOOGSTRAAL, H. & KAISER, M. N. **Observations on Ticks (Ixodoidea) of Libya.** *Ann. Entom. Soc. of America.* 1960, July, v. 53, No. 4, 445–57. [Numerous refs.]

"Details are provided concerning 14 species of ticks of which the authors have seen Libyan material. Insufficient search for ticks in this area probably is responsible for lack of records of about a dozen other species, which are discussed here. The status of five others, reported from Libya in the literature, is considered uncertain, published records for three additional species appear to be incorrect, and another one involves a nomen nudum. The importance of certain small wild animals as hosts of *Hyalomma* spp. in immature stages is noted. *Hyalomma marginatum turanicum* and *H. m. rufipes* probably were introduced into Libya by southward and northward migrating birds, respectively. Most tick species recorded from Libya are of obvious economic importance, yet little is known about their biology, range, incidence, or relation to disease in this area."

RAGEAU, J. & VERVENT, G. Les tiques (Acariens Ixodoidea) des Iles Françaises du Pacifique. [**The Ticks of the French Pacific Islands**] *Bull. Soc. Path. Exot.* 1959, Nov.–Dec., v. 52, No. 6, 819–35, 6 figs. [66 refs.]

In this paper the authors have brought together all the available records of ixodid ticks in French Polynesia and Melanesia. A key for separating the 8 species belonging to 6 genera collected from the islands is given and a table shows the distribution in the islands, and the hosts of the various species.

Among the argasid ticks, two species are represented, *Argas persicus* and *Ornithodoros capensis*, the latter most probably introduced by marine birds. Of the ixodid ticks, *Rhipicephalus sanguineus*, which parasitizes dogs, cats and human beings in New Caledonia, also appears to be an introduced species. *Haemaphysalis bispinosa* has been recorded from dogs, cattle, deer and horses in New Caledonia and New Hebrides and *Amblyomma breviscutatum* from pigs, dogs, human beings, cattle and horses. The two species of *Boophilus microplus* and *annulatus* are recent introductions; *microplus* has been taken from cattle, deer, horses, dogs and human beings in New Caledonia and *annulatus* from cattle in Tahiti. The paper includes the description of a new species, *Amblyomma laticaudae*, based on 3 nymphs and a larva collected from a sea snake, *Laticauda colubrina*, in New Caledonia. *M. G. R. Varma*

Reid, J. A. **Resistance to Dieldrin and DDT and Sensitivity to Malathion in the Bed-Bug *Cimex hemipterus* in Malaya.** *Bull. World Health Organization*. Geneva. 1960, v. 22, No. 5, 586–7.

Reports of resistance to DDT, BHC and dieldrin in bed bugs were made early in 1958 from plantations and one hospital in Malaya. Malathion at 0·5% was recommended and with useful results [this *Bulletin*, 1959, v. 56, 1290].

Bed bugs, from an estate sprayed four times with dieldrin between March 1956 and March 1958 and then twice or thrice with malathion, were collected, cultured and tested on insecticide-treated paper strips in the laboratory against DDT, dieldrin and malathion. Complete resistance was found to dieldrin, tolerance to DDT (perhaps due to private usage of DDT) and high susceptibility to malathion. Some loss of dieldrin resistance occurred in 7 months of laboratory culture. Comparative tests with a strain of bed bugs from buildings in Kuala Lumpur, mainly sprayed with DDT and seldom with dieldrin and never malathion, showed this latter strain from Kuala Lumpur to be more resistant to DDT than to dieldrin and highly susceptible to malathion. [This species of bed bug must, presumably, also be *Cimex hemipterus*.] *D. S. Bertram*

Busvine, J. R. **The Importance of Synthetic Pyrethroids.** *Bull. World Health Organization*. Geneva. 1960, v. 22, No. 5, 590–92. [Refs. in footnotes.]

The structural formulae of pyrethroid insecticides (pyrethrin I and II, Cinerin I and II, allethrin, furethrin, cyclethrin and Weiser's compound XVI) are set out and their chemical relationships discussed. Biological assay has been mainly with house-flies but data are available and here tabulated, showing for allethrin its effectiveness compared with pyrethrin against 12 species of arthropod, allethrin being generally less potent. Weiser's compound XVI, on data from fly tests, is a particularly promising new member of these several pyrethroids. Synergists appear, although not necessarily always so, more successful when combined with the pyrethrins than with the other insecticides of the group. Residual action is not notably great for any of the group. Cross-resistance of pyrethrin and allethrin is known for house-flies in Sweden [this *Bulletin*, 1959, v. 56, 670]. Only allethrin of the synthesized pyrethroids is manufactured on a large scale. It is not, in practice, cheaper than the natural pyrethrins and

its future as an alternative to pyrethrins depends on the (unlikely) prospect of cheaper productive methods, or possibly, a synergist suitably increasing the effectiveness of allethrin. *D. S. Bertram*

PAL, R. **Use of Pyrethrum in Vector Control.** *Bull. World Health Organization.* Geneva. 1960, v. 22, No. 5, 595–9. [54 refs.]

An account is given of possible ways of using pyrethrum for the control of bed bugs, lice, cockroaches, fleas, flies, mites (*Ornithonyssus bacoti*) and mosquitoes, the article summing briefly, for most of these, the principal procedures, formulations (including use of synergists) and results from the literature. Regarding mosquitoes, only a general statement is given to the effect that pyrethrum has its uses as an alternative to residual insecticides when resistance to these has developed, or quick kills of large numbers are required to control disease or lessen biting nuisance. Some good effects of pyrethrum applied to skin in different insect-repellent formulations are noted and also its importance as a quick-acting insecticide for killing insects lurking in aircraft.

D. S. Bertram

BUSVINE, J. R. **Resistance to Pyrethrins.** *Bull. World Health Organization.* Geneva. 1960, v. 22, No. 5, 592–3. [Refs. in footnotes.]

Cockroaches in America and house-flies in Sweden [this *Bulletin*, 1959, v. 56, 670] are recorded, respectively, as being 13 to 30 times and 11 to 14 times less susceptible than normal to pyrethrum, but otherwise resistance of much practical account to this insecticide is rarely found in the field. In both instances, resistance had previously developed in the field to other insecticides. Resistance to pyrethrin has been found in laboratory colonies of flies (× 5) [*ibid.*, 1952, v. 49, 89, 560] and bed bugs (× 10) [*ibid.*, 1959, v. 56, 990] initiated from DDT-resistant field populations, and also slight insensitivity in human lice [*ibid.*, 1957, v. 54, 943]. A tick (*Boophilus decoloratus*) combined an 18-fold pyrethrin resistance with DDT resistance, but only slight tolerance to pyrethrin (× 2 or × 3) with BHC resistance.

Pyrethrin resistance has been developed in the laboratory by selection from normal house-fly strains, but not higher than × 20 normal [*ibid.*, 1952, v. 49, 1159]. Although evidence for some association of DDT and pyrethrin resistance exists, neither resistance to chlorinated hydrocarbons nor to organophosphorus compounds need necessarily lead to pyrethrin resistance [*ibid.*, 1952, v. 49, 1004]. Pyrethrin resistance alone is not yet known in the field. Lack of residual action probably prevents that intense selection which is the basic mechanism promoting resistance to other insecticides. *D. S. Bertram*

MICKS, D. W. **Insecticide-Resistance. A Review of Developments in 1958 and 1959.** *Bull. World Health Organization.* Geneva. 1960, v. 22, No. 5, 519–29. [Numerous refs.]

The review covers from 1958 to August 1959 previous publications [this *Bulletin*, 1958, v. 55, 953, 1059 ; 1959, v. 56, 247, 923] dealing adequately with

insecticide resistance up to 1958. Of the 16 new species reported resistant in the period under review, 14 are anopheline species, the others being *Culicoides furens* and *Lucilia cuprina*.

An account is given, with literature citations, of the resistance characteristics of 28 species, of which 17 are anophelines (*Anopheles gambiae, A. stephensi, A. subpictus, A. pharoensis, A. sacharovi, A. sergenti, A. pulcherrimus, A. coustani, A. fluviatilis, A. vagus, A. barbirostris, A. annularis, A. culicifacies, A. minimus flavirostis, A. albimanus, A. aquasalis* and *A. pseudopunctipennis*), 4 culicines (*Aëdes aegypti, A. nigromaculis, Culex p. fatigans, C. pipiens*), and *Musca domestica, Lucilia cuprina, C. furens*, human lice, bed bugs (*Cimex lectularius* and *C. hemipterus*) and cockroach.

This is followed by concise statement of research developments on the genetics, physiology and biochemistry of DDT resistance, resistance to BHC and cyclodiene compounds, and to organo-phosphorus compounds. The article concludes on the topic of bromacetate compounds and phenylthiourea (PTU).

D. S. Bertram

MISCELLANEOUS PAPERS

GEAR, H. S. **Some Problems of the Medical Services of the Federation of Rhodesia and Nyasaland.** *Brit. Med. J.* 1960, Aug. 13, 525–31.

This paper begins with a brief glance back into the recent history of these countries, in all of which government and mission medical services have preponderated over private practice. The author goes on to explain the different administrative structures in each country and to discuss the difficulties brought about by federation and the amalgamation of the separate services; the Federal Ministry of Health has had a hard time since it was formed in 1954, but there has been no interruption of medical care.

The demand for medical care has increased enormously in a population which is now growing at the disturbing rate of about 3% each year, and which is "rapidly abandoning its previous pastoral, almost neolithic life". Whereas 25 years ago most Africans avoided European hospitals, they are now overwhelming them, and Gear attributes this to "the general acceptance of European culture and education, and the successful demonstration of scientific medicine". He does not mention African traditional medicine. To meet this demand there has been an increase of 50% in recurrent expenditure on health services in Southern Rhodesia, over 100% in Northern Rhodesia and nearly 300% in Nyasaland, between 1953 and 1959, calculated in sterling [but making no allowance for fall in the value of money]. These are substantial figures.

Disease patterns are changing and malaria, sleeping sickness and tropical ulcer are declining, though schistosomiasis is widespread and tuberculosis increasing; malnutrition is reported to be lessening.

The author ends with a review of general policy, which at first was inevitably aimed at curative services, and which at present maintains free government services which do not fit well with any extensive system of private practice. The

future organization depends on political decisions, and "until the way is politically clearer, planning is not profitable, daily administration is makeshift, and the construction of a vigorous, keen service almost impossible".

Charles Wilcocks

JELLIFFE, D. B. & BENNETT, F. J. **Indigenous Medical Systems and Child Health.** *J. Pediatrics*. St. Louis. 1960, Aug., v. 57, No. 2, 248–61, 8 figs. [38 refs.]

"Probably more than half the ill children in the world today are receiving treatment based on local concepts which differ widely from those of the Western world." The paediatrician should understand the power and extent of these local concepts, which attribute disease either to magical-supernatural agencies (sorcery, witchcraft, the wrath of the gods etc.) or to physical-empirical factors (eating pork or green coconuts, breathing bad air, the hot-cold concept). Of these it seems that the magical-supernatural system is the more potent.

"If one believes that putting a child's feces in a recognized spot will enable an ill-wisher to come at night to obtain some for bewitchment purposes, it is unlikely that the argument about giving hookworm to someone else will prevail."

Some groups recognize "European" diseases, which are amenable to Western therapy, and differentiate these from the local diseases related to witchcraft, with their important psychosomatic undertones, but although a thorn in a child's foot may be the obvious cause of suppuration, and removal may lead to cure, local belief, held with religious conviction, assumes a malignant influence which led the child to tread on the thorn, and this must be identified and checked. [And, as the reviewer remembers, a responsible African foreman employed in a public health department may agree to having a whitlow opened, but may ask for a week's leave to counteract the magic which he held to have caused the whitlow.]

This is an important and urgent matter, and "until the life at home is changed substantially, teaching of scientific hygiene often will continue to be essentially confusing and contradictory for children". [It is a subject which goes far beyond medicine—failure of crops, for instance, may be put down to evil influences—but one which has not attracted the serious attention it deserves, and which these authors recognize.] *Charles Wilcocks*

LAPEYSSONNIE, L. Le problème des eaux de surface en Afrique intertropicale considéré d'un point de vue écologique. [**The Problem of Surface Waters in Africa South of the Sahara Considered from the Ecological Aspect**] *Méd. Trop.* Marseilles. 1960, May–June, v. 20, No. 3, 315–38.

The problems of disease transmission and control connected with surface waters in Africa south of the Sahara are considered in this paper. Water is intimately associated with the spread of communicable disease because it collects pollution, conserves it for a period and returns it again to man through his domestic supplies. Nearly all diseases transmitted by water share a common epidemiological factor, human faecal contamination. The pathogen may be

transferred directly from the intestine of an infected host to that of a susceptible one through the medium of water; viral, bacterial and protozoal infections discharged in the faeces are thus spread, while the extra-corporeal development of intestinal helminths is dependent on water maintaining humidity in the soil. Again, surface water may harbour the intermediate host of a parasite or the aquatic developmental stages of an insect vector. Schistosomiasis and dracontiasis exemplify the former and are widespread, constituting grave health and socio-economic problems. Among the insect vectors associated with water the anophelines and *Simulium* are pre-eminent and they alone are discussed here.

In the case of faecal-borne disease spread by water, control measures must be directed primarily towards sanitary disposal. This is difficult in the conditions of ignorance, poverty and climate prevailing in Africa. There is a brief discussion of suitable sanitary measures of disposal and protection and purification of water, and of methods of control of the aquatic stages of insect vectors. The author concludes by saying that herd immunity rests on a pyramid of corpses, and he urges that, since the child is most vulnerable to infection and most educatable, control measures should be centred on him. *T. H. Davey*

DEGROOTE, V. Note préliminaire sur les flèches empoisonnées et les poisons de flèches au Congo belge. **[Preliminary Note on Poisoned Arrows and Arrow Poisons in the Belgian Congo]** *Ann. Soc. Belge de Méd. Trop.* 1960, Feb. 29, v. 40, No. 1, 97–104.

Poisoned arrows, used for hunting animals, have frequently been examined by the Toxicology Service of the Institute of Tropical Medicine at Léopoldville. Recent (January, 1960) events have led to the revival of old tribal practices and the manufacture of poisoned arrows is on the increase.

The present note is based on the examination of about 100 arrows and lists the analyses of 52 collected during the past 2 years from Oshwe and the Stanleyville area and other parts of the Congo. The arrows were made of wood, were about 38 cm. long and weighed 2·9 gm. Shallow spiral grooves were cut into the heads for a distance of 3–7 cm. to assist the adherence of dark brown, grey or black, glossy or matt poisoned material. A few short sharpened wooden pegs were also examined; these were designed to be set in the ground to trap the unshod and were poisoned in the same way. Metal-pointed arrows were seldom poisoned.

Chromatographic analysis of the arrow poisons showed almost all to contain cardiotoxic glycosides derived from species of *Strophantus*. The most common were k-strophanthin (*S. kombe*) and ouabain (*S. gratus*), and glycosides from other, unidentified Apocynaceae were also present. On one occasion eserine (from *Physostigma venenosum*) and on 3 occasions strychnine (probably from *Strychnos icaja*) were identified.

In addition to the main poison, half of the arrow poisons examined contained saponins derived from undetermined plant sources. The saponins had haemolytic activity at dilutions of 1 in 100 to 1 in 100,000 and were more rapid in action if the arrow was fresh. The saponins decompose on exposure to air.

Also present in the poison was an assortment of organic bases such as putrescine, cadaverine, betaine, tyramine, methylamine and agmatine. These

came from a concoction reputed to contain crocodile and toad livers, snake venom and other animal material in a state of advanced putrefaction. In the fresh state, the toxic proteins contained in some of these organs might be very dangerous.

The author immersed poisoned arrows in serum at 37°C. and found that, even with freshly-poisoned arrows, it took at least 2 seconds for a human lethal dose of poison to dissolve into the medium. The arrows are not brittle and it should usually be possible to pull one out of a wound within 2 seconds. The author thinks that the victim would then suffer little more than temporary malaise. [However, he does not consider the bacteriological implications of an injection of putrefied crocodile liver into tissues which may be locally paralysed or necrosed by vegetable poisons.]

[See also RAYMOND, this *Bulletin*, 1940, v. 37, 72.] *L. G. Goodwin*

REPORTS AND SURVEYS

See also p. 1246, WEST AFRICAN INSTITUTE FOR TRYPANOSOMIASIS RESEARCH, **Annual Report 1959.**

WALTERS, J. H. **An Environmental Study of a Remote Tropical Community.** [Paper read before the Royal Society for the Promotion of Health at the Congress held at Eastbourne, 28th April to 2nd May, 1958.] 1958, 9 pp., 4 figs.

Ilobi is a village with an agricultural community of the Yoruba race, situated in Nigerian rain-forest. It has no surfaced roads, no organized sanitation, drainage or refuse disposal. But cocoa and kola are grown ; perhaps 6 farmers' annual incomes top £400, and the usual sequelae of cocoa farming—the cement house and the tin roof—are to be seen. The diet is simple but clearly adequate though very little manufactured food is imported. The nutritional status of roughly 75% was classified as good, and of only about 3% as poor. However, hyporiboflavinosis was almost universal, but other vitamin deficiencies were not common. The nearest orthodox medical station is a little used clinic 12 miles away.

Detailed examinations were made of 1,019 inhabitants out of an estimated total of 1,100. The population age structure was typical of a community with high birth and death rates. 19·3% were over 40 years old, as compared with 46·9% in rural Devon, and the death rate up to the age of 15 was estimated as 350 per 1,000 births. From the age of 2 years the children were shorter and lighter than corresponding English children. Haemoglobin levels were surprisingly high ; plasma proteins were high also, mean 8·32 gm. per 100 ml., reflecting the globulin increase in a heavily parasitized community.

[The status of communicable diseases was investigated thoroughly: only the most striking findings are given.] Tuberculosis was common. Mass X-ray was not done, but clinically there were noted 8 cases of pulmonary disease, 5 of bone disease and 1 meningitis. Venereal disease was virtually absent. There was evidence that 5 antigenically related arthropod-borne viruses were active—yellow fever, dengue, Zika, Uganda S and West Nile. By the age of 15, 75% of the population are immune to yellow fever, though clinical cases are not seen. Possibly multiple infections by the other 4, relatively innocuous, viruses prime the defence mechanism so that rapid generation of specific antibodies swamps the developing viraemia of yellow fever.

Despite its load of disease the village thrives, modestly and irresponsibly, but always cheerfully. *B. B. Waddy*

BOOK REVIEWS

RUCH, Theodore C. [Ph.D.], with the editorial assistance of Maryeva W. TERRY, B.A. **Diseases of Laboratory Primates.** pp. xxvi + 600, numerous figs. 1959. Philadelphia. London: W. B. Saunders Co. [52s. 6d.]

The author intends to write a monograph on the primates, of which this volume forms the first part. The work is being undertaken on a systematic and exhaustive basis, and the series, when completed, will form a unique source of information on simian behaviour in health and disease. Anyone who works with primates will find this work quite invaluable.

The use of the word "laboratory primate" in the title is a little misleading because practically every primate other than man is included in some way or another in the text: nearly all species have been used in the laboratory, except perhaps for some of the rarer tarsioids or lemurs. The major purpose of the book is said to be to describe the diseases of the rhesus monkey (*Macaca mulatta*), but it is far more comprehensive, and forms a complete guide to present day knowledge of primates in general.

The author might have arranged this book in various ways—according to the nature of the disease or infection, the species of primate, morbid anatomy, etc.; but he ignores such systematic approaches in favour of the more practical one of a description of the different organs or tissues of the body in response to disease; in other words, he visualizes the animal as it might be seen at necropsy and discusses pathology on a regional basis. A few chapters are written differently because of the specialized importance of their contents; thus separate chapters are devoted to nutrition and diet; intestinal diseases due to bacteria, viruses, protozoa and helminths; tuberculosis; neoplasms. Eight chapters describe the diseases of the mouth and teeth, abdomen and chest, cardiovascular system, blood, central nervous system, endocrine and genito-urinary systems, bone and skin.

The book is up to date, and contains much unpublished information provided by the numerous specialists (and others) who reviewed each chapter. Interesting

data are to be found in every chapter, with details of infection rates, serological tests, etc., collected from the widest survey of the literature, while descriptions of special incidents are plentifully supplied and make the book lively reading. Particularly useful will be found the description of treatment, including prophylaxis, prevention and rehabilitation, and for this reason alone, possession of this book is essential for the practical worker.

The curious arrangement of the text, whereby any one chapter may contain information about conditions as diverse as neuroses, tetany, toxoplasmosis or tuberculosis, inevitably results in some duplication, which a good index, however, helps to clarify. But a few minor mistakes are liable to creep in when a subject has happened to be too specialized for the reviewer: thus in the chapter on intestinal protozoa, "cysts" of *Trichomonas* are referred to [they are absent in the genus], obstruction of the intestine by *Giardia* is said to occur [surely most improbable], etc.

The book is well illustrated with large-scale figures of diseased organs and of histological sections. The text is clearly set out, and references are given in adequate numbers at the end of each chapter. The binding is faulty and the cover was loose, which is regrettable in a book obviously destined for heavy wear in many laboratories. *P. C. C. Garnham*

GROBER, Julius, HORN, Herwarth & OBERDOERSTER, Friedrich. **Gesundheitstaschenbuch für die warmen Länder. Tropenärztlicher Ratgeber für Reise und Beruf.** [Handbook of Health for Warm Climates. Advice on Tropical Diseases for Travellers and Those Working in the Tropics] 332 pp., illustrated. 1960. Berlin C2: VEB Verlag Volk und Gesundheit, Neue Grünstrasse 18. [DM 18.80.]

This little *Taschenbuch* represents a new departure in books dealing with tropical medicine as it is designed primarily for laymen—travellers and businessmen, who cannot always obtain immediate medical help. That being so one is left wondering how this mixed salad will appeal.

The authors have been very ambitious in the scope of their task for, after tackling the vast subject of hygiene, including climatology, clothing, personal hygiene, immunization, acclimatization, water supply, food, sterilization and disinfection, they proceed to discuss a vast list of tropical diseases, one by one, straying here and there into general medicine and touching on such subjects as syphilis, appendicitis, lung diseases, hernia and colic. There are hints about insurance, not only personal, but also for belongings, and considerations about mortality rates in the tropics. To complete the work there are tables of weights and measures and comparisons between the metric and decimal systems. There is an adequate bibliography, as well as a glossary of medical terms for the layman.

With such a vast programme the descriptions of various diseases are necessarily sketchy. A word of criticism may be directed to the illustrations, especially the outline drawings of helminths and those of insect vectors, some of which are not altogether satisfactory. The work is dedicated to Bernhard NOCHT, that great *Nestor notabilis* of German tropical medicine. *Philip Manson-Bahr*

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